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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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74-1524. Gunn, D. L. (Taylors Hill, Chilham, Canterbury, Kent, England). **Dilemmas in conservation for applied biologists.** *Ann. Appl. Biol. 72(2): 105-127; 1972.* (74 references)

DDT has appeared everywhere, but the question of its hazard to man and his environment remains unanswered. Although DDT has inhibited photosynthesis in some algae in the laboratory, concentrations necessary for this inhibition could hardly occur in the ocean or any natural situation. Changes in flora and fauna in bodies of water and declines of bird populations have been attributed to DDT, but evidence is not convincing. Conflicts over pesticides can be resolved when facts are established as shown by the compromise reached over the use of mercury seed dressings. Mercury can be used on autumn cereals, when necessary, and if other food for birds is readily available. Compromises should be reached with DDT since it is valuable in agriculture and public health.

74-1525. Anonymous. **Emergency use of DDT okayed.** *Chem 26/ Paper Processing 10(4): 18; 1974.*

EPA has announced that if an emergency arises at the time of egg hatching, the U.S. Forest Service will be granted a temporary exemption from the restrictions of the federal pesticides law; this will allow the use of DDT against the tussock moth in the Pacific Northwest. Prior to spraying DDT, the Forest Service must post warnings. Additional restrictions will limit the locations and conditions under which the spraying may be conducted. The tussock moth has devastated 800,000 acres of forest lands—mostly Douglas fir—in Oregon, Washington, Montana, and Idaho. The forest industry and top leaders in these states have hailed EPA's announcement as a decisive action. They feel that the Forest Service has done the best it could in controlling the tussock moth without DDT. Other people both within and outside the forest industry feel that no situation justifies the use of DDT and that the forests will suffer even greater damage if bird populations are allowed to dwindle due to the continued use of DDT.

74-1526. Richardson, J. W.; Badger, D. D. **Environmental and economic impacts of alternative methods of insect management on cotton in Oklahoma.** *Current Farm Econ. 46(4): 18-27; 1973.* (10 references)

Without pesticides the national farm output would decrease about 27%, and cotton yields in Oklahoma would decrease by about 100 lb per acre. Increased cotton production in Oklahoma due to insecticide use resulted in a consumer savings of about $1,100,000 in 1971 and about $2,000,000 in 1972. In Oklahoma's four cotton producing counties (Jackson, Harmon, Tillman, Washita) cotton farmers have generally applied pesticides at rates less than or equal to recommended rates. Insecticides are used to the greatest extent in wet years while herbicide use is not a function of rainfall. Toxaphene and methyl parathion have been substituted for DDT since the bollworm complex developed resistance. The major insecticides used on cotton in this area have caused minor damage to man, livestock, and wildlife, as have desiccants and defoliants; herbicides used for weed control have not damaged nontarget vegetation. Alternative methods for controlling insects include: the use of non-persistent insecticides; insect scouting programs; strip cropping cotton with grain sorghum; and the cessation of chemical and biological insect control procedures. The preferred alternative method involves stripping the cotton with grain sorghum. Farmer's net returns per acre are greater under the preferred method than the present system, and farm output is estimated to increase under the strip cropping method.

74-1527. Mauranges, P. (Author address not given). **Surveillance et controle des eaux polluees. [Surveillance and control of polluted waters.]** *Econ. Med. Anim. 14(2): 119-127; 1973.* (French)

General problems of water quality monitoring are discussed with respect to water pollution by pesticides. Automatic water monitoring and alarm networks should be set up which would notify water users of accidental pollution episodes in water bodies. Pesticides, especially organochlorine insecticides, may accumulate through the trophic chains in water, and thus be harmful to humans due to the consumption of food products with high pesticide levels. Non-biodegradable organochlorine pesticides should be replaced by biodegradable organophosphorus or carbamate pesticides, and by new, selective preparations such as attractants.

74-1528. Devlin, R. M. (Univ. Massachusetts, East Wareham, MA 02538). **DDT: a renaissance?** *Environ. Sci. Technol. 8(4): 322-323; 1974.*

According to WHO officials, DDT has been largely responsible for relieving more than 1,000 million people from the threat of malaria in the past 25 years. DDT use also controls other serious diseases (e.g., encephalitis, bubonic plague, yellow fever, cutaneous leishmaniasis) and pests such as the tussock moth which, unchecked, could destroy fir forests in Washington and Oregon. Curtailment of DDT production in the United States could have serious consequences in the U.S. and abroad. Environmentalists claim that DDT is responsible for the drastic decline in the number of osprey, peregrine falcons, and eagles. However, these birds were declining in numbers before the advent of DDT, and no causal relationship between DDT and the disappearance of these birds has been proven. Environmentalists also claim that DDT causes eggshell thinning, decreasing reproductive success, but no conclusive evidence has appeared. Other chemicals, notably polychlorinated biphenyls, could be responsible for eggshell thinning. Possible mechanisms by which DDT might induce eggshell thinning have been suggested but not proven.

74-1529. Anonymous. **The growing rebellion against EPA could cripple your sales.** *Farm Chem. 137(3): 15-17; 1974.*

There is considerable skepticism regarding EPA's ability to develop workable pesticide control programs. Much of the skepticism stems from EPA's being staffed at the upper levels by people who have not worked with pesticides and who do not know agriculture. As of October 21, 1974, all pesticides except those registered at the state level for special local needs must be federally registered or approved. However, before a state can request a registration for special local need, it must be certified by EPA as capable of exercising adequate controls over pesticide usage. EPA estimates that many states will have difficulty being certified, and this will ultimately penalize the grower of specialty and small acreage crops who needs pesticides to produce his crop. A workable system to solve the specialty and small acreage crops dilemma must be developed. Another problem involves the classification of pesticides into general and restricted use categories. Pesticides with restricted use may be applied by certified applicators only. States have only one year to submit a program for applicator certification to EPA. Most states do not have the money, personnel, or information necessary to draft such a program.

74-1530. Handler, P.; Zucker, A. (Nat. Acad. Sci., Washington, DC 20418). **Between complacency and panic.** *Fed. Proc. Fed. Amer. Soc. Exp. Biol. 32(7): 1748-1753; 1973.* (6 references)

The public has become more aware of environmental problems, but focuses on the more immediate and personal problems. The more serious long-term environmental issues are often overlooked. The attention given to these long-term issues will determine the economic, social, and cultural environment for subsequent generations. First and second order risks and benefits of the use and proscription of each individual chemical must be determined. In the evaluation of possible environmental alternatives, allowances must be made for effects that are not really predictable and applications between unlimited use and complete banning. These issues should be decided soon, but they should be decided carefully. The establishment of a national energy policy has similar problems. The need for environmental understanding will probably influence research in many scientific disciplines. Ultimately, the environment becomes a personal matter requiring sacrifice of material goods, comfort, or convenience and tied up in a reduction of laissez-faire economics, property rights, and personal expectations.

74-1531. Merrill, L. G., Jr. (Inst. Environ. Studies, Rutgers Univ., State Univ. New Jersey, New Brunswick, NJ 08903). **DDT— an uncommon carrier.** *International Conference on Transportation and the Environment, Washington, DC, May 31-June 2, 1972. Paper No. 720631, pp. 215-223.* (13 references)

The history of DDT is useful in illustrating mistakes in the approach to new chemicals and uses of chemicals which must be avoided in the future. With DDT effects other than first-order effects were determined early, but often ignored or not publicized by workers involved. These effects included reduction of non-target, beneficial organisms, the development of resistance and cross-resistance, accumulation of residues in humans and the environment, biomagnification, and, possibly, carcinogenesis and disruption of photosynthesis. Stresses placed upon other systems as a result of new solutions to old problems should be made public and investigated immediately. A number of new indices are being developed to aid scientists, lawmakers, and the general public in determining the relative importance of such stresses.

74-1532. Wolff, A. H.; Oehme, F. W. (Sch. Public Health., Univ. Illinois Med. Cent., Chicago, IL 60680). **Carcinogenic chemicals in food as an environmental health issue.** *J. Amer. Vet. Med. Ass. 164(6): 623-629; 1974.* (76 references)

Substances with suspected carcinogenic properties may frequently enter the food chain if they have been inadequately evaluated. The problem of carcinogenic agents in foods is complex; difficulties are encountered in setting standards or tolerance levels. Potentially carcinogenic substances in foods include intentional and unintentional food additives, inorganic substances, animal drugs, and a variety of other chemicals. Among the unintentional food additives are various insecticides, fungicides, and herbicides. DDT and several chemically related chlorinated hydrocarbon insecticides have been reported carcinogenic in lower animals, as have at least 20 additional chemical compounds used mainly as fungicides and herbicides.

74-1533. Sankaranarayanan, K. (Dept. Radiat. Genetics Chem. Mutagenesis, State Univ. Leiden, Leiden, The Netherlands). **Conference report: First International Conference on Environmental Mutagens.** *Mutat. Res. 26(3): 209-215; 1974.*

The First International Conference on Environmental Mutagens was divided into seven sessions covering 50 papers. The first session, on mutagens in the biosphere, included a discussion of pesticides and the factors that relate to their formation, persistence, bioconcentration, metabolic and photochemical transformation, and long-range transport. The second session was devoted to environmental mutagen testing in various organisms. In discussing the cytological effects of pesticides, it was argued that pesticides constitute a nonhomogeneous class of chemicals whose cytological effects range from not observable to extensive and greater than those known for certain recognized

mutagens. The sensitivity of organisms to pesticide treatment varies and is influenced by factors such as ploidy, life form, and nuclear volume. The third session was devoted to repair and other modifying factors involved in mutagenesis; the fourth covered ways and means of evaluating the effects of mutagens in human populations; the fifth focused attention on the relationship between mutagenesis and carcinogenesis; the sixth dealt with the collation of the literature in the field by the Environmental Mutagen Information Center in Oak Ridge, Tennessee. The final session was conducted as a panel session on governmental, industrial, and consumer concerns relating to environmental mutagenesis.

74-1534. Jukes, T. H. (Div. Med. Physics, Univ. California, Berkeley, CA 94720). **Insecticides in health, agriculture and the environment.** *Naturwissenschaften 61(1): 6-16; 1974.* (89 references)

Insecticides are essential to the health and welfare of mankind and must be used, particularly in developing countries, where lives are threatened by disease or starvation. DDT continues to be the most important means of malaria control, although resistance has developed in some species of mosquitoes. DDT is inexpensive, and there is no experimental evidence that it has accumulated in the oceans or that it is toxic at insecticidal levels, or that it is carcinogenic. Alternative controls have not been developed to a point where they could practically replace pesticides.

74-1535. Anonymous. **Herbicidal warfare.** *Sci. Amer. 230(4): 49-51; 1974.*

Between 1962 and 1971, U.S. military forces sprayed 20 million gallons of herbicidal chemicals (2,4-D and 2,4,5-T, picloram, and cacodylic acid) on 4 million acres of South Vietnam. According to a committee repart from the National Academy of Sciences, serious long-term damage was done to Vietnamese forests although the fertility of cropland was probably not adversely affected. Whether or not humans were or will be made sick or genetically damaged by the herbicides has not been decided. About 36% of the coastal and riverine mangrove forests were destroyed, and without a massive reforestation program, it may take well over 100 years for the mangrove area to be reforested. The destruction of these forests has resulted in the loss of important spawning and feeding grounds for many fish and shellfish. Malaria-carrying mosquitoes and rats have proliferated in the devastated areas. There was also a substantial, and possibly underestimated, loss in merchantable timber. Reports of sickness and death among residents of the highland forest regions following spraying missions should be investigated.

74-1536. Shapley, D. (Author address not given). **Herbicides: Academy finds damage in Vietnam after a fight of its own.** *Science 183(4130): 1177-1180; 1974.*

The report of the National Academy of Sciences Committee on the Effects of Herbicides in Vietnam was released on February 28, 1974, after some of the most bitter internal fighting in Academy history. The disputes arose over external political considerations as well as differences involving members of the committee and review panel and officers of the Academy. One major dispute was over the appointment of a former consultant to the Arms Control and Disarmament Agency to the review panel. Another major dispute was over the extent of damage suffered by South Vietnam's merchantable inland forest. The final report stated an estimated loss of 1.25 million cubic meters, with the range of possible loss being from 500,000 to 2 million acres. In addition, at least one committee member refused to serve on the committee until nonmilitary funds were found to support him (the committee was originally funded by the Department of Defense). Further controversy developed over the assessment of the medical effects of the herbicides. The final report states that serious long-term damage was done to Vietnamese forests (particularly the mangrove forests), that the fertility of the cropland was probably not adversely affected, that the herbicide program helped turn Vietnamese opinion against the U.S. during the war, and that further investigation is needed to determine whether humans were or will be made sick or genetically damaged by the herbicides.

74-1537. Anonymous. **Serious defoliant damage in Vietnam.** *Sci. News 105(11): 174-175; 1974.*

Between 1961 and 1971, the U.S. military dropped more than 100 million pounds of herbicides on Vietnam. After studying the effects of the sprayings, the National Academy of Sciences concluded that the sprayings caused extensive ecological damage, had adverse psychological effects on the attitudes of the Vietnamese people regarding the United States, and had adverse physiological effects on certain Vietnamese populations, especially the Montagnards. With regard to the physiological effects, reports of deaths among the Montagnard children are as yet incompletely assessed, but there is no conclusive evidence that herbicides cause birth defects in humans. Adverse effects on vegetation were largely confined to plants which came into direct contact with the chemical agents, the mangrove forests being the hardest hit. About 36% of Vietnam's mangrove trees were destroyed. Well over 100 years may be needed for the mangrove areas to be reforested without a massive reforestation program. Losses in merchantable timber were extensive and serious. Some members of the committee feel that the degree of damage has been underestimated.

74-1538. Lu, F. C. (Author address not given). **Mercury as a food contaminant.** *WHO Chronicle 28(1): 8-11; 1974.*

The average level of mercury in food is 0.02 ppm. However, food can be grossly contaminated by the inadvertent use of seeds treated with mercury containing fungicides. Most of the mercury in foods is inorganic, but much of the mercury in fish is in the form of methylmercury which is more toxic than metallic or inorganic mercury. Aryl, alkyl, and alkyoxyalkyl mercury can be found in foods treated with fungicides used in agriculture. Several cases of mercury poisoning have been caused by the ingestion of grain treated with alkyl mercury compounds or meat from animals fed on such grain. The clinical manifestations of mercury poisoning include sensory disturbances, tremor, and ataxia. Chromosome breakages and the level of mercury in the lymphocytes are positively correlated. Labeling treated seeds can help control the incidence of poisoning due to the inadvertent use of seeds treated with mercurial fungicides. The extent of mercury exposure in man can be estimated by determining the mercury levels in the blood or hair. The Joint FAO/WHO Expert Committee on Food Additives recommends a provisional tolerable weekly intake of 0.005 mg/kg total mercury of which not more than 0.0033 mg/kg should be present as methylmercury.

74-1539. Simonffy, Z.; Jancso, E.; Takacs, J. (Central Lab. Vet. Meat Control Serv., Budapest, Hungary). **Incidence of chlorinated hydrocarbon pesticides in meat and meat products.** *Acta Vet. Acad. Sci. Hung. 23(2): 145-152; 1973.* (6 references)

Chlorinated hydrocarbon pesticides were extracted from homogenized samples of muscle, fatty tissue, and liver taken from cattle and hogs slaughtered for human consumption. Qualitative and quantitative determinations were then carried out using thin layer and gas chromatography. Aldrin and dieldrin were detected in eight samples, with the concentrations being within permissible ranges in all instances. Only one sample of semi-preserved canned shoulder contained DDT residues in levels above those allowed by current Hungarian regulations. The concentrations of BHC isomers were always within permissible limits. Generally speaking, the bovine muscle, liver, and fatty tissues contained more DDT than BHC, while the fatty tissues contained 10 times more DDT and 5 times more lindane than the muscle tissues. There was a significant variation in the quantity of pesticide residues in animals from different farms.

74-1540. Berezovskiy, M. Ya.; Nemova, G. N. (K. A. Timiryazev Moscow Acad. Agr. Sci., Moscow, USSR). **Osobennosti primeneniya gerbitsidov proizvodnykh simm-triazina na torfyanykh pochvakh. [Peculiarities in the use of *sym*-triazine-derived herbicides in peaty soils.]** *Agrokhimiya 12: 102-110; 1973.* (11 references) (Russian)

The herbicidal action, adsorption, desorption, and migration of common and ^{14}C-labeled simazine, atrazine, propazine, and prometryne were studied in peaty soils. The herbicides were applied in doses of one to 12 kg/ha. Adsorption rate was very high and desorption of *sym*-triazines in peaty soils was both slow and incomplete. The rate of adsorption of atrazine was 19 times higher in peaty soils than it was in turfy podzolic soils. Therefore, *sym*-triazines have reduced herbicidal efficiency in peaty soils. Migration of *sym*-triazines was negligible with precipitation in the soil. Prometryne remained within the upper 5 cm layer of the soil. Inactivation of prometryne in 2-3 months and inactivation of propazine in 1.5-2 yr were determined with oats as test plant.

74-1541. Beestman, G. B.; Deming, J. M. (Res. Dept., Agr. Div., Monsanto Commercial Products Co., St. Louis, MO 63166). **Dissipation of acetanilide herbicides from soils.** *Agron. J. 66(2): 308-311; 1974.* (7 references)

Three commercial α-chloroacetanilide herbicides (alachlor, butachlor, and propachlor) were surface-applied in aqueous solution to Ray silt and Wabash silty clay soils. Herbicide dissipation followed first order kinetics with short field half-lives ranging from 2 to 14 days depending upon the herbicide and soil type. Leaching did not contribute to dissipation in that no residues were found below the upper 4 cm layer. Dissipation from sterilized soil was 50 times slower than from viable soil, indicating that microbial decomposition played a major role in herbicide degradation. Rapid herbicide volatilization occurred from continuously moist soil exposed to a constant 21°C, 3.2 kph air stream, but little loss occurred from dry soils. Atrazine was also rapidly lost from moist soil under these conditions, with volatilization rates falling in the order propachlor>atrazine>alachlor>butachlor.

74-1542. Varis, A. L. (Agr. Res. Cent., Dept. Pest Investigation, Tikkurila, Finland). **Loss of lindane, dimethoate, and methyl parathion residues from seedlings of sugar beet as influenced by plant growth.** *Ann. Agr. Fenn. 11(6): 381-385; 1972.* (8 references)

Sugar beet seedlings were dressed with lindane and thiram on the day of sowing, sprayed with dimethoate 14 days after sowing, or dusted with methyl parathion 14 days after sowing. The aerial portions of the cotyledonous plants were analyzed for insecticide residues 1 to 23 days after treatment. Fifteen days after treatment lindane was found at a concentration of 15 ppm in the plants. After 2 to 3 days this residue was reduced by 50%, and after 6 days it was reduced by 87%. On the first day after treatment, dimethoate residues of 10 ppm and methyl parathion residues of 0.50 ppm were found. The dimethoate residues decreased by 50% within 2 to 3 days, and the methyl parathion residues decreased by 50% within 24 hours. Both residues had decreased by 90% after 6 days. The plants grew rapidly during this period, with reductions in pesticide residues of 73% being attributable to plant growth alone.

74-1543. Bromilow, R. H. (Rothamsted Exp. Sta., Harpenden, Herts., England). **Breakdown and fate of oximecarbamate nematicides in crops and soils.** *Ann. Appl. Biol. 75(3): 473-479; 1973.* (12 references)

Losses of active material DuPont 1410 or aldicarb (aldicarb sulfoxide) from soil were similar, each having a half-life of about two weeks. Aldicarb itself disappeared almost completly within 11 days. Less than 20% of the loss observed for aldicarb sulfoxide in sandy loam overlying sandy clay loam was due to leaching. Negligible amounts of the toxic material were found below 30 cm. Residues in potatoes grown in soil treated with 11.2 kg/ha aldicarb did not exceed 0.15 ppm, a level considered safe by presently accepted standards.

74-1544. Crosby, D. G. (Dept. Environ. Toxicol., Univ. California, Davis, CA). **The fate of pesticides in the environment.** *Annu. Rev. Plant Physiol. 24: 467-492; 1973.* (250 references)

Both biological and nonbiological transformation

of pesticides in the environment involve oxidation, reduction, and hydrolysis reactions. Other nucleophilic reactions and certain elimination and isomerization reactions also play an important role in nonbiological transformations. The energy, either heat or UV light, and the reagents are plentiful. Although most biological transformations are degradative, synthetic processes such as conjugation occur. Differences in metabolism of pesticides by various organisms provide one of the bases of selectivity. Probably the most important contribution to pesticide degradation is made by the large and varied soil microflora.

74-1545. Glass, B. L.; Edwards, W. M. (Agr. Environ. Qual. Inst., Agr. Res. Serv., U.S. Dept. Agr., Beltsville, MD). **Picloram in lysimeter runoff and percolation water.** *Bull. Environ. Contam. Toxicol. 11(2): 109-112; 1974.* (8 references)

The movement of picloram in the surface runoff and percolation water from a lysimeter which was initially treated with picloram at 2 lb/A (2.24 kg/ha) was studied under natural conditions for 24 months. Detectable levels of picloram appeared in the runoff water up to 7 months after treatment. During this period, runoff water removed 0.007% of the picloram originally applied to the lysimeter. The highest pesticide concentration (14.5 ppb) was detected 1 month after treatment, following the first significant rainfall. Since the picloram concentration decreased steadily with time, the risk of water contamination by runoff is greatest soon after application. Picloram was initially detected at 1.0 ppm in the percolation water that was intercepted 2.5 m beneath the soil surface nearly one year after treatment. During the last two months of the study, picloram residue levels of 0.6 ppb and 0.5 ppb were detected. Leaching of picloram did not appear to be a major route of dissipation in this soil.

74-1546. Giam, C. S.; Richardson, R. L.; Taylor, D.; Wong, M. K. (Texas A&M Univ., College Station, TX). **DDT, DDE and PCBs in the tissues of reef dwelling groupers (Serranidae) in the Gulf of Mexico and the Grand Bahamas.** *Bull. Environ. Contam. Toxicol. 11(2): 189-192; 1974.* (10 references)

Concentrations of chlorinated hydrocarbons were determined in the muscle tissue of groupers taken from the Gulf of Mexico and the Northern Caribbean. The pollutant levels were generally low with little possible danger existing with regard to human consumption. At locations where the pollutant levels were low, e.g., Grand Bahamas, a size versus pollutant concentration relationship could not be accurately observed. However, at Anton Lizardo, where the chlorinated hydrocarbon concentration was about an order of magnitude higher than in the Grand Bahama samples, the pollutant levels in the groupers increased with size.

74-1547. Stickley, B. D. A. (Bureau Sugar Exp. Stations, Brisbane, Australia). **Studies on the persistence of aldrin, dieldrin, heptachlor, lindane and crude BHC formulations in four Queensland soils.** *Bureau of Sugar Experiment Stations, Queensland, Technical Communications, No. 1, 1972.* (25 references)

Gamma-BHC (lindane) was applied to four major soil types from the cane growing areas in Queensland, Australia, as lindane or as crude BHC formulations containing different percentages by weight of the gamma isomer. The persistence of gamma-BHC increased as the percentage of this isomer in the crude BHC formulations decreased, with gamma-BHC from the lindane treatments being the least persistent. Pure alpha, beta, and delta isomers of BHC and dieldrin did not affect the persistence of the gamma isomer. Lime had no effect on the persistence of gamma-BHC, and there was no evidence of breakdown products of BHC due to the presence of lime in the soil. The greater persistence of gamma-BHC applied as crude BHC appeared to be due to the presence of other compounds in the crude product. Aldrin and heptachlor were epoxidized to dieldrin and heptachlor epoxide in the soils, and 43 months after insecticide application the residues consisted almost entirely of the epoxides. Dieldrin was the most persistent of the four insecticides tested, with 35 and 60% of the insecticide applied remaining in the soil at the end of the investigation.

74-1548. Binkley, R. W.; Oakes, T. R. (Dept. Chem., Cleveland State Univ., Cleveland, OH 44115). **Photochemical reactions of alkyl 2,4-dichlorophenoxyacetates.** *Chemosphere 3(1): 3-4; 1974.* (5 references)

The ethyl, butyl, and 2-methylheptyl esters of 2,4-dichlorophenoxyacetic acid dispersed in water in an open vessel were subjected to pyrex filtered irradiation using a mercury-vapor lamp. The corresponding esters of 2- and 4-chlorophenoxyacetic acid were formed as were hydrogen chloride and 2,4-dichlorophenoxyacetic acid. The quantum yields for the formation of the first two products were 0.05 and 0.10, respectively. Since photodegradation proceeds differently in 2,4-dichlorophenoxyacetic acid and in the ethyl, butyl, and 2-methylheptyl esters, it can be expected that photochemical decay does also, especially before and after hydrolysis under conditions of herbicidal use. The esters of 2- and 4-chlorophenoxyacetic acid are stable regarding photochemical degradation. Photochemical decay may represent a significant process for the esters of 2,4-dichlorophenoxyacetic acid under conditions of herbicidal use.

74-1549. Kumar, Y.; Semeluk, G. P.; Silk, P. J.; Unger, I. (Dept. Chem., Univ. New Brunswick, Fredericton, N. B., Canada). **The photochemistry of carbamates VI: the photodecomposition of meobal (3,4-xylyl-*N*-methyl carbamate) and mesurol (4-methylthio-3,5-xylyl-*N*-**

methyl carbamate) *Chemosphere 3(1): 23-27; 1974.* (11 references)

The photolysis of meobal and mesurol (methiocarb) was studied in aerated and degassed ethanol and cyclohexane solutions. The exciting wavelength for mesurol photolysis was 300 nm. Most meobal photolyses were carried out at 265 nm with a few at 313 nm. The major photolysis products of meobal were 3,4-dimethylphenol, 2-hydroxy-4,5-dimethyl-*N*-methylbenzamide, and 2-hydroxy-5,6-dimethyl-*N*-methylbenzamide. The photolysis of mesurol yielded only one major product, 4-methylthio-3,5-dimethyl phenol.

74-1550. Cochrane, W. P.; Forbes, M. A. (Inst. fuer oekologische Chemie, 8051 Attaching, Germany). **Oxidation products of heptachlor and its metabolites – a chemical study.** *Chemosphere 3(1): 41-46; 1974.* (16 references)

The CrO_3 oxidation of heptachlor produced heptachlor epoxide, a monocarboxylic acid, and chlorendic acid. CrO_3 oxidations were also carried out with the two known hydroxy metabolites of heptachlor. In both instances, ring-opening was the predominant oxidative pathway yielding only one acidic product, chlorendic acid. A minor hexane soluble product, 1-keto-2,3-epoxychlordene, was also isolated. Chromatographic identification methods for use in metabolic studies are discussed.

74-1551. Acker, L. (Westfaelische Wilhelms-Universitaet Muenster, Inst. fuer Lebensmittelchemie, Muenster, Germany). **Lebensmittelchemie im Dienste des Verbraucherschutzes. [Food chemistry for the benefit of consumer protection.]** *Deut. Lebensm.-Rundsch. 70(1): 5-12; 1974.* (24 references) (German)

Tasks and possibilities of food chemistry in consumer protection are described, and general problems of food contamination with PCBs and pesticides are discussed. Organochlorine pesticide residues, such as lindane, DDT, and its metabolites, accumulated in the fatty tissue. The DDT, DDE, DDE+DDT, BHC, and PCB residues in human fatty tissues from Cologne, Goettingen, Hamburg, Munich, and Berlin populations were in the respective ranges of 0.82-2.0 ppm, 2.9-7.8 ppm, 3.8-9.8 ppm, 6.8-10.9 ppm, and 2.9-6.8 ppm. The proportion of DDE within the total DDT increased, but DDT concentrations did not in underweight subjects. The α-BHC, lindane, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, *o,p'*-DDT, total DDT, heptachlor, heptachlor epoxide, aldrin, dieldrin, hexachlorobenzene, and PCB residue concentrations in milk- and butter-fat samples ranged from 0.03-0.11 ppm, 0.01-0.11 ppm, 0.02-0.14 ppm, 0.01-0.10 ppm, 0.006-0.02 ppm, 0.10 ppm, 0.04-0.38 ppm, 0.016 ppm, 0.01-0.05 ppm, 0.016 ppm, 0.02-0.06 ppm, 0.15-0.17 ppm, and 0.33-0.39 ppm. Dried egg yolk samples from the Netherlands, Denmark, East Germany, and China contained 0.01-0.04 ppm α-BHC, 4.3-14.0 ppm β-BHC, 0.01-0.36 ppm lindane, 0.06-1.9 ppm DDT, 0.09-7.7 ppm DDE, 0.005-0.01 ppm dieldrin, 0.005-0.008 ppm heptachlor epoxide, 0.03-0.18 ppm hexachlorobenzene, and 0.05-0.45 ppm PCBs.

74-1552. Meyer, H. (Nestle Gruppe Deutschland GmbH, Frankfurt/M., Germany). **Die Bedeutung des Lebensmittelchemikers aus der Ernaehrungsindustrie fuer den Umweltschutz. [The importance of the food chemist from the food industry for the protection of the environment.]** *Deut. Lebensm.-Rundsch. 70(1): 24-27; 1974.* (German)

General problems of food chemistry in environmental protection, and a new regulation concerning the maximum allowable pesticide residue levels in food products of animal origin are discussed. The maximum allowable hexachlorobenzene, alpha-BHC plus beta-BHC, lindane, and dieldrin residue levels related to fat content are set at 0.5, 0.1, 0.2, and 0.15 ppm in milk and milk products; 0.5, 0.1, 0.1, and 0.1 ppm in eggs; and 0.5, 0.3, 0.7, and 0.2 ppm in fats. Analyses of milk and milk products in 1973 showed hexachlorobenzene, alpha-BHC plus beta-BHC, lindane, and dieldrin concentrations of 0.1-2.7 ppm, 0.1-3.4 ppm, 0.1-0.3 ppm, and 0.1-0.4 ppm. Eggs contained 0.1-0.23 ppm of hexachlorobenzene and 0.023-0.04 ppm of lindane. The hexachlorobenzene, alpha-BHC plus beta-BHC, lindane, and dieldrin residues in pork fat averaged 0.07 ppm, 0.01 ppm, 0.01 ppm, and 0.01 ppm. Foods of animal origin are primarily contaminated through feed; maximum allowable pesticide residue levels should have been established first for the animal feed rather than for the food products.

74-1553. Szabolcs, L.; Racz, E. (Country Institute for Food Control and Chemical Analysis, Gyor, Hungary). **Novenyvedoszer-maradekok vizsgalata gyorsfagyasztott elelmiszerekben. [Investigation of residues of plant protecting agents in quick-frozen foods.]** *Elelmiszervizsgalati Kozlem. 19(6): 315-320; 1973.* (3 references) (Hungarian)

Thin-layer chromatography was used to investigate residues of plant protection agents in quick-frozen spinach, pumpkin, peas, strawberry, and sour cherry. The quick-frozen foods were processed from raw materials harvested after the prescribed waiting periods for pesticide application had elapsed: 60 days for spinach treated with treflan (trifluralin); 60 days for peas treated with sevtox (DNBP, ammonium salt); 10 days for pumpkin after treatment with orthocide (captan) 14 days for strawberry and sour cherry treated with orthocide and methyl parathion. Quick-frozen raspberry and sour cherry contained methyl parathion residues slightly below the maximum allowable concentration of 0.5 mg/kg. No plant protection agent residues whatsoever were detected in the other products examined.

74-1554. Kohegyi, I.; Molnar, P. (Baranya County Public Health and Epidemiological Station, Pecs, Hungary). **Gramoxoneval kezelt termeny paraquat-maradek vizsgalata. [Investigations of residues of paraquat in agricultural products treated with gramoxone.]** *Elelmiszervizsgalati Kozlem. 19(6): 327-330; 1973.* (17 references) (Hungarian)

The residue dynamics of paraquat in broomcorn grains was studied by Calderbank-Yuen's method which has a sensitivity of 0.01 mg/kg at a recovery rate of 85%. Broomcorn was desiccated with gramoxone (paraquat) in Sept. 1970. Grain samples were first analyzed for paraquat residues in Oct. 1971 when residue levels ranging from 0.48-0.88 mg/kg, against a maximum allowable content of 0.5 mg/kg, were found. After continued storage until Jan. 1973, when the sampling was repeated, the paraquat residue level fell to below the maximum allowable concentration with values ranging from 0.05 to 0.14 mg/kg. Decomposition of paraquat residues can be accelerated by UV irradiation.

74-1555. Gomaa, H. M.; Rosen, J. D.; Faust, S. D. (Keramchemie Corporation, Donmills, Ontario, Canada). **Permanganate-induced nitration of *o*- and *p*-nitrophenol.** *Environ. Lett. 2(1): 47-49; 1971.* (1 reference)

A 25% conversion to 2,4-dinitrophenol resulted from reaction of 0.718 mmole *p*-nitrophenol with 2.0 mmole potassium permanganate in one liter of phosphate buffer, pH 3.1, at 20° for 75 min. Lesser amounts of 2,4-dinitrophenol were formed at pH 5.0, 8.1, and 10.6; at 10.6 additional materials were formed. The reaction is probably a combination of two nitrophenoxy radicals and C-N bond formation by these radicals instead of C-C bond formation.

74-1556. Uthe, J. F.; Reinke, J.; O'Brodovich, H. (Dept. Environment, Fisheries Marine Service, Halifax Lab., Nova Scotia, Canada). **Field studies on the use of coated porous polyurethane plugs as indwelling monitors of organochlorine pesticides on polychlorinated biphenyl contents of streams.** *Environ. Lett. 6(2): 103-115; 1974.* (13 references)

The efficacy of using coated polyurethane foam plugs as indwelling water monitors was studied under field conditions, as was the ability of such foams to quantitatively extract polychlorinated biphenyls, dieldrin, and members of the DDT complex from industrial and agricultural waters. Within 24 to 48 hours, the indwelling foams extracted in excess of 90% of the pesticide compounds; the maximum levels extracted indicated that only the external surfaces of the porous plugs were active. The plugs were reusable and performed well in the field. The integrative ability of an indwelling foam offers all of the advantages of indwelling biological monitors (ability to see slugs of material, concentrative effects, etc.) without any of the disadvantages (transportation of live animals, water quality essentials, predation, etc.).

74-1557. Schipfer, L. (Author address not given). **Rueckstaende im Tabak nach gezielter Anwendung von Fungiziden und Insektiziden im Feld. [Residues in tobacco after precise use of fungicides and insecticides in field.]** *Fachliche Mitt. Oesterr. Tabakregie 14: 266-272; 1973.* (13 references) (German)

Field experiments, carried out in 1969 to investigate residues in tobacco after application of maneb and metiran for the control of *Peronospora tabacina*, were repeated in 1971 under different conditions. The concentration and the frequency of the treatments were reduced to the lowest limit preventing infections. The residue levels determined in 1971 were considerably lower than those in 1969. Maneb residues averaged 49.4 ppm and metiram residues 56 ppm, which would not exceed legal restrictions. Fungicide residues in the leaves decreased with time, especially when the waiting period between last treatment and reaping was increased and when rain fell in the meantime. Redrying leaf tobacco and one year's storage in hogsheads did not considerably reduce the residue levels. In another experiment aldrin, vamidothion, methidathion, phosphamidon, dimethoate, and methomyl were applied. After 50-79 days, 0.046-0.018 ppm of aldrin, 0.093-0.37 ppm of dieldrin, and 0.1 ppm of methomyl were detected.

74-1558. Schmidt, K. (Author address not given). **Wirksamkeit der Trinkwasseraufbereitung bei der Eliminierung von Pestiziden und anderen Schadstoffen. [Effectiveness of standard drinking water preparation for eliminating pesticides and other pollutants.]** *Gas-Wasserfach Wasser/Abwasser 115(2): 72-76; 1974.* (11 references) (German)

The effectiveness of various procedures in eliminating pesticides and PCBs from drinking water was studied. Residues were determined in rainwater and river water in West Germany. In rainwater samples 183-839 ng of α-BHC, 46-404 ng of lindane, and 41-401 ng of *p,p'*-DDT per liter were measured. Some river water samples contained up to 999 ng of lindane, *p,p'*-DDT, and endosulfan. Green algae, such as *Chlorella* and *Cladophora* accumulated pesticides such as endosulfan, hexachlorobenzene, lindane, heptachlor, aldrin, dieldrin, and *p,p'*-DDT. Percolation under anaerobic conditions eliminated over 80% of lindane, α-BHC, heptachlor, telodrin, heptachlor epoxide, endosulfan, dieldrin, *p,p'*-DDD, *p,p'*-DDT, and methoxychlor. Slow sand filtration and, especially, adsorption on activated carbon eliminated over 80% of the tetrachlorobenzene, hexachlorobenzene, lindane, α-BHC, heptachlor, aldrin, telodrin, heptachlor epoxide, endosulfan, dieldrin, *o,p'*-DDT, *p,p'*-DDD, *p,p'*-DDT, methoxychlor, malathion, dimethoate, diuron, linuron, and PCB residues from water; ozonization, chlorination, oxidation with potassium permanganate, and flocculation proved to be only moderately effective.

74-1559. Trubnikova, T. I. (Institut Sel'skoy Gigiyeny, USSR). **Gigiyena truda pri primenenii gerbitsida semerona. [Occupational hygiene during the application of semeron.]** *Gig. Tr. Prof. Zabol. 17(6): 43-45; 1973.* (4 references) (Russian)

Semeron (desmetryne) in the air of the respiration zone, in soil, on the clothes, and on the skin of workers was determined during application of the low-toxicity herbicide. The semeron concentrations in the zone of respiration averaged 0.002-0.05 mg/m^3. The average semeron concentrations on the skin and on working clothes ranged from 0.0002-0.016 mg/100 cm^2 and 0.01-0.088 mg per 100 cm^2. The semeron concentrations in soil samples taken at 5 m, 25-50 m, and 100 m distances from the sprayer were 0.07 mg/100 cm^3, 0.005 mg/100 cmm^3, and 0.001 mg/100 cm^3. Semeron was not detected in soil samples taken 25 days after application from the upper 30 cm soil layer.

74-1560. Silk, P. J.; Unger, I. (Dept. Chem., Univ. New Brunswick, Fredericton, N.B., Canada). **The photochemistry of carbamates, I. The photodecomposition of zectran: 4-dimethylamino-3,5-xylyl-*N*-methyl carbamate.** *Int. J. Environ. Anal. Chem. 2: 213-220; 1973.* (11 references)

Zectran (mexacarb) was photodecomposed in aerated and degassed cyclohexane and ethanol solutions. The major photoproducts were 4-dimethylamino-3,5-dimethyl phenol, 4-hydroxy-2,6-dimethyl-*N*-methyl benzamide, and 4-monomethylamino-3,5-xylyl-*N*-methyl carbamate. These results indicate that the photochemical dissociation proceeds through two primary steps: photo-Fries rearrangement yielding the phenol and benzamide products; and a carbon-nitrogen bond cleavage in the dimethylamino moiety of zectran, followed by hydrogen atom abstraction to produce the monomethylamino carbamate. The excitation wavelength was > 296.7 nm; i.e., radiation available in the solar spectrum. Thus, the products observed in this study would occur in the environment as a result of the action of sunlight on zectran.

74-1561. MacNeil, J. D.; Frei, R. W.; Frei-Haeusler, M.; Hutzinger, O. (Res. Station, Canada Dept. Agr., Summerland, British Columbia, Canada). **Electron donor-acceptor reagents in the analysis of pesticides. VII. A simple model system hydrolysis of some carbamate pesticides.** *Int. J. Environ. Anal. Chem. 2(4): 323-330; 1973.* (9 references)

A simple but versatile method for preliminary investigation of the stability of carbamate pesticides was developed, and mobam, carbaryl, IPC, and CIPC were studied. Solutions of the pesticides in various buffers were sampled over a 5-wk period, and samples were chromatographed on silica gel thin layers and analyzed in situ by reflectance spectroscopy following spraying of the chromatogram with CNTNF to form visible pi-complexes. Carbaryl and mobam were stable at pH 2 and decomposed completely within one week at pH 8. The major hydrolysis products, studied in the same manner, were found in maximum amounts at the time of disappearance of the parent compound from pH 8 and 9 buffers. The *N*-phenyl carbamates were persistent in both acidic and basic buffers.

74-1562. Segi, I.; Mar'yenko, V. G.; Guyash, F. (Dept. Microbiol., Timiryazev Acad. Agr. Sci., USSR). **Izucheniye adsorptsii gerbitsida gramoksona v pochvennykh usloviyakh. [Adsorption of the herbicide gramoxone under soil conditions.]** *Izv. Timiryazev. Sel'skokhoz. Akad. 4: 14-19; 1973.* (6 references) (Russian)

A microbiological method designed to determine the toxicity of gramoxone (paraquat) was also used to study the adsorption of gramoxone by soil particles. In toxicity tests with *Bacterium fluorescens, Bacillus mycoides, Bacillus subtilis, Rhizobium melioti, Rh. trifolii, Rh. leguminasorum,* and *Azotobacter chroococcum* the latter was the most susceptible to gramoxone and thus suitable for the microbiological detection of gramoxone. Different types of soils adsorbed 0.25 to 2.25 mg of gramoxone per g. Washing out of cations from soil colloids intensified the adsorption of gramoxone, while the extraction of humus from the soil decreased the adsorption ability of the soil. Among soil minerals bentonite possessed the highest adsorption capacity for gramoxone.

74-1563. Aleshin, S. N.; Yudina, L. P. (Dept. Phys. and Colloid Chem., Timiryazev Acad. Agr. Sci., USS). **Adsorptsiya *N*-(3,4-dikhlorfenil)-*N*-metoksi-*N*-metilmocheviny pochvennymi adsorbentami. [Adsorption of *N*-(3,4-dichlorophenyl)-*N*-methoxy-*N*-methylurea (linuron) by soil adsorbents.]** *Izv. Timiryazev. Sel'skokhoz. Akad. 4: 112-118; 1973.* (16 references) (Russian)

The adsorption of linuron by particles of three different soil types (turfy podzolized soil, chernozem, and krasnozem-red soil) was studied. The linuron adsorption isotherms obtained are S-shaped, indicating two-stage adsorption of linuron by the soil adsorbents. The first stage of the adsorption isotherm, relative to the surface of soil particles with or without organic substances, obeys Langmuir's law. This, however, does not apply to adsorption on turfy podzolized soil without organic substances. The second stage of the adsorption on linuron monolayer can also be described by Langmuir's equation; however, adsorption on krasnozem is linear. The largest quantity of linuron was adsorbed by chernozem and krasnozem, soils containing more humus than turfy podzolized ones. The linearity of the first stage of the adsorption isotherm for the mineral fraction of turfy podzolized soils is caused by an increase in the number of free sites as a result of the loosening-up action of adsorbed linuron.

74-1564. Kaufman, W. J. (Deceased). **Chemical pollution of ground waters.** *J. Amer. Water Works Ass. 66(3): 152-159; 1974.* (21 references)

The chemical pollution of ground waters is discussed in terms of the occurrence and transport of pesticides among other factors in ground water. Pesticides are a potential but as yet unrealized problem in relation to ground water supplies. Although numerous investigators have examined pesticide transport in soils, findings have not proven that ground-water pollution from transport is extensive or significant. Loss by volatilization and probably by biological and chemical degradation, functioning in conjunction with favorable adsorption relationships, may prevent serious pollution problems. Wastewater reclamation will not be a major source of groundwater pollution by pesticides except where pesticides are discharged into municipal sewers as industrial wastes. Processes involved in pesticide biodegradation should be studied further since it is possible that they could be enhanced by certain types of agricultural practices.

74-1565. Tsukano, Y. (Fourth Lab. Agr. Chemicals, Nat. Inst. Agr. Sci., Japan). **Factors affecting disappearance of BHC isomers from rice field soil.** *Jap. Agr. Res. Quart. 7(2): 93-97; 1973.* (6 references)

Factors affecting the disappearance of BHC isomers from flooded soil were studied. Experiments were carried out in a greenhouse at 25°C using raw, clay loam alluvial soil. α-BHC showed rapid release and diffusion from granules, relatively high volatility from water surfaces, a relatively low affinity for soil, high mobility in soil, and high degradability in flooded soil. δ-BHC, on the other hand, showed relatively slow release and diffusion from granules, low volatility from water surfaces, relatively high affinity for soil, low mobility in soil, and low degradability in flooded soil. Thus, the δ-isomer would tend to persist for long periods at or near the soil surface. Various other factors would have to be considered before the less persistent δ-isomer could be applied in practical situations.

74-1566. Joiner, R. L.; Baetcke, K. P. (Toxicol. Section, Stauffer Chemical Co., Richmond, CA 94804). **Identification of the photoalteration products formed from parathion by ultraviolet light.** *J. Ass. Offic. Anal. Chem. 57(2): 408-415; 1974.* (12 references)

A comparison of the effects of various time periods of ultraviolet light on the formation of rearrangement products of parathion is presented. Twelve products were separated and identified by thin layer chromatography in 4 systems, and were confirmed by infrared spectroscopy, when possible. The effect of 2 solvents, methanol and acetone, on the formation and percentage composition of photoalteration products of parathion from high-intensity ultraviolet light is also discussed. Retention times are given for each component from gas chromatography by electron capture and flame photometric detection. (Author abstract by permission)

74-1567. Goldberg, E. D. (Author address not given). **The surprise factor in marine pollution studies.** *J. Mar. Technol. Soc. 8(2): 29-34; 1974.* (40 references)

Some of the unexpected results obtained by marine scientists during recent pollution studies are discussed. Study of the ecological distribution of the halogenated hydrocarbons, especially DDT, provided information regarding the transport of large organic molecules from the continents to the oceans. DDT transport studies first pointed out the significance of atmospheric transfer mechanisms. The quantities of chlorinated hydrocarbons conveyed to the oceans via the atmosphere approximately equal the amounts introduced via river water. Methyl groups play an important role in the mobilization of metals and nonmetals in biological systems. Pollution studies have revealed the ability of some marine organisms to accumulate substances from solution whose concentrations are in the parts per billion or trillion level. Other studies have shown that many natural and anthropogenic organic compounds are not completely biodegradable.

74-1568. Jefferies, D. J.; Stainsby, B.; French, M. C. (Nature Conservancy, Monks Wood Exp. Station, Huntingdon, Great Britain). **The ecology of small mammals in arable fields drilled with winter wheat and the increase in their dieldrin and mercury residues.** *J. Zool. 171(4): 513-539; 1973.* (45 references)

Dieldrin and mercury residues were measured in long-tailed mice (*Apodemus sylvaticus*), bank voles (*Clethrionomys glareolus*), and field voles (*Microtus agrestis*) living in arable fields before and after the drilling of dieldrin and mercury dressed winter wheat. *Apodemus* fed on the dressed wheat immediately after drilling. Mean whole body loads of dieldrin increased from 2.46 to 166.8 μg, and mercury loads from 0.62 to 6.57 μg; maximum body load recorded was 298 μg dieldrin and 13.8 μg mercury. The concentrations increased during the first two weeks after drilling and reached lethal levels in some animals. Stored lipids markedly decrease in these animals with the onset of cold weather, which may intensify the effects of the dieldrin residues. *Clethrionomys* inhabited the edges of the field and, since few individuals wandered onto the field surface, dieldrin levels increased only slightly, from 0.01 to 0.56 ppm. *Microtus* were seldom found at the edges of the field and never on the field surface. The uneven distribution of *Apodemus* over the field surface indicates the possible existence of populations of field mice. The data indicates that the use of dieldrin and mercury as dressings for cereals drilled in autumn and spring is dangerous to predators like kestrels which feed on the small field mammals. The voluntary ban on the use of these materials in spring provides only partial protection for these predators.

74-1569. Zimmerli, B.; Marek, B. (Abteilung Lebensmittelkontrolle, Sektion Pestizidrueckstaende und

Kontaminationen, Eidgenoessisches Gesundheitsamt, Bern, Switzerland). **Die Belastung der schweizerischen Bevoelkerung mit Pestiziden. (Analysen von zubereiteten Mahlzeiten, Humanfetten, Humanserum, Zigaretten und Kosmetika). [The pesticide burden of the Swiss population (analyses of prepared meals, human fat, human serum, cigarettes, and cosmetics.]** *Mitt. Geb. Lebensmittelunters. Hyg. 64(4): 459-479; 1973.* (55 references) (German)

Pesticide residues were determined in 15 home-prepared meals, 12 human adipose samples, 13 human serum samples, 13 samples of cigarette smoke condensate, and 14 cosmetic preparations. Hexachlorobenzene, β-BHC, *p,p'*-DDE, *p,p'*-DDT, dieldrin, and PCBs were the main contaminants in human adipose tissues, human blood serum, and prepared meals. Hexachlorobenzene, α-BHC, β-BHC, lindane, total BHC, heptachlor epoxide, *p,p'*-DDE, *p,p'*-DDD (TDE), total DDT, dieldrin, malathion, and PCB residue levels in different prepared meals composed of milk and milk products, meat and meat products, fish, poultry, fats, cereals, pastry, cakes, potatoes, fruits, vegetables, fruit juices, and beverages ranged from 2.21-7.44, 1.04-6.55, 0.50-4.20, 1.96-4.81, 7.14-10.71, 0.29-0.57, 1.83-2.73, 0.51-1.61, 0.65-3.61, 3.69-6.75, 0.75-5.17, 4.7-71.2, and 6.84 μg, respectively. The hexachlorobenzene, β-BHC, *p,p'*-DDE, *p,p'*-DDT, total DDT, dieldrin, and PCB residue levels in human fat samples ranged from 0.6-4.8 ppm, 0.3-1.8 ppm, 0.6-9.9 ppm, 0.8-5.2 ppm, 1.9-16.3 ppm, 0.07-0.57 ppm, and 0.4-2.2 ppm. Pooled human serum samples contained 4.0 ppb of hexachlorobenzene, 3.4 ppb β-BHC, 0.4 ppb lindane, 14 ppb *p,p'*-DDE, 5.3 ppb *p,p'*-DDT, 1.1 ppb dieldrin, and 11 ppb PCBs. The average concentrations of lindane plus α-BHC, *p,p'*-DDE, *p,p'*-DDD, *p,p'*-DDT, total DDT, dieldrin, and endrin in cigarette smoke condensates were 0.028, 0.23, 0.78, 0.40, 2.29, 0.023, and 0.006 μg. The hexachlorobenzene, α-BHC, β-BHC, lindane, *p,p'*-DDT, *p,p'*-DDE, and dieldrin residue levels in lipsticks, hand creams, and body lotions ranged from 1-80 ppb, 1-550 ppb, 270-8,270 ppb, 1-230 ppb, 120-1,300 ppb, 10-180 ppb, and 10-1,220 ppb. Except for dieldrin the residue content did not exceed 10% of the Acceptable Daily Intake. The exposure of the Swiss population to pesticide and mercury residues compares favorably with the situation in other countries.

74-1570. Acker, L.; Schulte, E. (Institut fuer Lebensmittelchemie, Univ. Muenster, Muenster, Germany). **Chlorkohlenwasserstoffe im menschlichen Fett. [Organochlorine compounds in human fat.]** *Naturwissenschaften 61(1): 32; 1974.* (5 references) (German)

Residues of PCBs and organochlorine pesticides were determined in human fat samples from Cologne, Goettingen, Hamburg, Berlin, and Munich. The PCB residue levels did not vary regionally. The DDT, DDE, BHC, and PCB residue levels were 0.91, 2.9, 2.9, and 6.8 ppm in Cologne; 0.88, 3.4, 8.2, and 7.5 ppm in Goettingen; 0.97, 3.9, 5.9, and 7.9 ppm in Hamburg; 1.3, 6.2, 4.8, and 9.1 ppm in Berlin, and 1.3, 5.7, 6.4, and 10 ppm in Munich. The α-BHC, β-BHC, lindane, *o,p'*-DDT, *p,p'*-DDD (TDE), heptachlor epoxide, and dieldrin levels were in the respective ranges of 0.014-0.031 ppm, 0.46-1.3 ppm, 0.057-0.16 ppm, 0.030-0.58 ppm, 0.018-0.029 ppm, 0.062-0.12 ppm, and 0.082-0.23 ppm. The share of DDE increased from 65% in previous analyses to 80% due to the predominant intake of DDT and DDE in foods of animal origin. The ratio of β-BHC to total BHC is higher than that in the technical product due to its slow metabolism.

74-1571. Takizawa, Y.; Kurayama, R.; Minagawa, K. (Sch. of Pub. Health, Fac. of Med., Akita Univ., Akita, Japan). **[On the amounts of organochlorine pesticide residues, PCB and TCB as well as mercury in gray starlings which inhabit Japanese north eastern region.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 91; 1974.* (Japanese)

Total mercury, methyl mercury, PCB, TCB, polychlorocyclodienes, and organochlorine pesticide residues including BHC (α, β and γ-isomer) and DDT derivatives, were determined in homogenized pectoral muscle and feathers of 18 gray starlings and nine red-checked starlets caught in Iwate Prefecture. Organochlorine compounds were actually determined on the fat extracted from the homogenate. Total mercury in feathers of both birds was significantly higher than in muscles (2.16/0.046 in gray starling, 0.415/0.026 ppm in starlet). Methylmercury in feathers from starlings was eight times higher than in starlets (1.09 vs. 0.136 ppm). Noticeable amounts of β-BHC and *p,p'*-DDE, and some dieldrin were detected in both kinds of birds. Contents of β-BHC and *p,p'*-DDE in starling muscle averaged 0.036 and 0.040 ppm, whole basis; those in starlet muscle were 0.008 and 0.067 ppm. Organochlorine residues in these wild birds were generally lower than those in river fish such as dace.

74-1572. Inoue, Y.; Abe, J.; Takamatsu, M.; Aoki, N. (Sch. of Environ. Hyg., Fac. of Med., Kurume Univ., Kurume, Fukuoka, Japan). **[A study on the qualitative and quantitative ratio of PCB and organochlorine pesticide residues in the blood and the adipose tissue.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 92; 1974.* (Japanese)

The contents of PCB, β-BHC, *p,p'*-DDT and *p,p'*-DDE were determined in blood (plasma) of 17 persons before a laparotomy and in adipose tissue obtained during a laparotomy. Values in adipose tissue averaged in the above order: 1.6 ± 0.75, 3.0 ± 2.27, 1.2 ± 1.37, and 5.1 ± 4.6 ppm; and those in plasma were 4.9 ± 1.93, 11.8 ± 7.74, 4.4 ± 3.45, and 18.9, ± 11.3. The contents of β-BHC ($p<0.001$) and *p,p*-DDE ($p<0.01$) were correlated in adipose tissue and in plasma. A correlation was not found between PCB and β-BHC content, although one seemed to exist in PCB-intoxicated patients. This

suggests that PCBs had not reached an equilibrium in healthy persons; however, it may also merely reflect the fact that PCBs consist of many isomers.

74-1573. Abe, J.; Inoue, Y.; Takamatsu, M. (Sch. of Environ. Hyg., Fac. of Med., Kurume Univ., Kurume, Fukuoka, Japan). **[On the residual amounts of PCB and organochlorine pesticides in human blood.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 93; 1974.* (Japanese)

PCBs, β-BHC, *p,p'*-DDT, and *p,p'*-DDE were determined in the blood of a variety of subjects including PCB-intoxicated patients, and healthy inhabitants of western regions of Japan, Kyoto Prefecture, Kurume City, Yokote City, rural Chikugo County, and in an area adjacent to a pesticide factory. β-BHC contents in blood were significantly lower in inhabitants of Yokote City than in inhabitants of Western regions of Japan (4.8 vs. 10.6 ppm), probably reflecting the pollution by argicultural BHC-application. The same tendency was noticed among farmers in Asakura (West Japan) and in Yokote (North-Eastern Japan): 17.9 ppm in males and 15.3 in females versus 4.8 and 2.3 ppm. β-BHC contents were significantly ($p<0.01$) higher in blood of PCB-intoxicated patients than in blood of healthy persons (18.3 ppm vs. 10.6 ppm). PCB and β-BHC were significantly correlated ($p<0.05$) in the blood of PCB-intoxicated patients (6.4 ppm vs. 18.3) and not in healthy persons. PCB and β-BHC contents were significantly higher in men than in women.

74-1574. Shirakawa, M. (Sch. of Pub. Health, Fac. of Med., Kurume Univ., Fukuoka, Japan). **[On the results of investigation of the pesticide residues in the milk from lactating women of coastal areas in Wakayama Prefecture.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 94; 1974.* (Japanese)

Contents of α-, β-, γ- and δ-BHC, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, and dieldrin were determined in Dec. 1971 in the whole milk and milk-fat of 31 lactating women of Wakayama Prefecture one to five months after delivery. The detection percentage of BHC and DDT was 100 and that of dieldrin 67.7. A similar investigation involving the entire country by Min. of Health and Welfare during Jan. through April 1971 had percentages of 100, 100, and 79.1. Percentages for α-, β-, γ- and δ-BHC had a ratio of 1.26:95.9:2.73:0.11 compared to 2.5:95.0:2.0:0.5 for the entire country investigation. Total BHC, total DDT, and dieldrin were higher in milk of women of farming families than that of non-farming families in Wakayama Prefecture. Total BHC in this investigation was lower and that of total DDT three times higher than average values from the nation-wide investigation. Total BHC and total DDT were nearly proportional to the daily intake of cow milk and showed some correlation with beef intake. The highest contents of the above pesticides in whole milk were 0.0097, 0.3182, 0.0165, 0.0007, 0.1060, 0.3261, 0.0038, and 0.0058 ppm.

74-1575. Watts, B. B. (Agr. Chemicals Board, Wellington, New Zealand). **Minimising spray drift.** *N. Z. J. Agr. 127(5): 30-31; 1973.*

Pesticide drift, the movement of pesticides to places other than the intended target, can be minimized by: using a coarse nozzle at low pressure to avoid small droplets or fogging; not spraying into winds of more than 5 m.p.h.; avoiding application when temperatures are high; reading and following label directions; avoiding the use of formulations such as dusts which are most prone to drift; and knowing and observing local regulations. Drift should be avoided when using any pesticide, but especially when the hormone weedkillers to which many crops are susceptible are used. Promising techniques for reducing spray drift include: the use of foaming nozzles; the use of invert emulsions; the use of thickening agents; and charging of the sprayed particles with electricity of opposite attraction to that of the crop being sprayed.

74-1576. Mukherjee, G.; Banerjee, T.; Mukherjee, A.; Mathew, T. V. (Central Food Lab., Calcutta, India). **Loss of pesticide residues from rice and flour during baking and cooking.** *Res. Ind. 18(3): 85; 1973.* (4 references)

Rice samples were spiked with 1 ml standard 1% solutions of DDT, lindane, and malathion, after which they were washed with distilled water and cooked with fresh water. Both the wash water and cooled rice were extracted with petroleum ether. Almost one third of the pesticide residues were removed during washing, and the remaining residues disappeared almost entirely during cooking. However, the pesticides were not completely eliminated from the cooked rice. Chapaties were made from whole wheat flour spiked with 1 ml standard 1% solutions of DDT, lindane, and malathion. The residues persisted to some degree in the baked chapaties.

74-1577. Spencer, W. F.; Farmer, W. J.; Cliath, M. M. (Agr. Res. Serv., U.S. Dept. Agr., Univ. California, Riverside, CA 92502). **Pesticide volatilization.** *Residue Rev. 49: 1-47; 1973.* (103 references)

Volatilization and vapor-phase transport play significant roles in dissipation of pesticides from plant, water, and soil surfaces. Factors influencing volatilization include those affecting vapor pressure of the pesticide, rate of pesticide movement away from the evaporating surface, and rate of movement to the evaporating surface. Soil-incorporated pesticides or pesticides that have penetrated fruit or foliage volatilize at a greatly reduced rate dependent upon the effective vapor pressure of the pesticide within the soil or within the plant and its rate of movement to the evaporating surface. The effective vapor pressure may differ from the vapor

pressure of the chemical itself owing to adsorption on soil or other surfaces, solution in soil water, or solution in the oil or wax of leaves or fruit. The magnitude of the adsorption effect or reduction of the vapor pressure of a pesticide in soil is dependent mainly upon the nature of the pesticide, soil pesticide concentration, soil water content, and soil properties such as organic matter and clay content. The term codistillation is incorrectly used to describe pesticide volatilization. Volatilization of degradation products is important as a means of dissipating pesticides from soils. Additional work is needed to more accurately predict volatilization rates under field conditions. (Author abstract by permission, abridged).

74-1578. Leistra, M. (Lab. for Res. on Insecticides, Wageningen, The Netherlands). **Computation models for the transport of pesticides in soil.** *Residue Rev. 49: 88-130; 1973.* (52 references)

A comparative survey is made of the possibilities for using computation models in the quantitative study of pesticide transport in soil. Instances in which the various models have been used in research on pesticides and some other substances are discussed. Differential equations have been formulated with varying degrees of generalization, making use of the characteristics applicable to the pesticides-in-soil system. The nature of the basic data available for a quantitative approach is briefly discussed, reference being made to more detailed reviews in the case of each subject. Emphasis is on the chromatographic transport of pesticides with the liquid phase in soil. The effect of the different boundary conditions is clearly shown by comparing a number of analytical solutions for a typical case. Possible ways of extension, as by the introduction of decomposition, are dealt with. The discussion of computation models based on numerical solutions starts with comparatively simple types. Attention is given to peculiarities of these solutions like the pseudo-spreading effect. Where boundary conditions correspond, agreement between the results of analytical and numerical solutions are found to be good. The numerical models are suitable for the introduction of more complex relations and phenomena. This is shown in connection with computations for nonlinear adsorption isotherms, limited adsorption and desorption rates, and a layered soil profile. Attention is then given to the introduction of complementary computations as, for example, those relating to decomposition, the doses available for uptake by organisms, and the comparative importance of dissipation by transport and consumption processes. (Author abstract by permission)

74-1579. Van Genuchten, M. T.; Davidson, J. M.; Wierenga, P. J. (Dept. Agron., New Mexico State Univ., Las Cruces, NM 88003). **An evaluation of kinetic and equilibrium equations for the prediction of pesticide movement through porous media.** *Soil Sci. Soc. Amer. Proc. 38(1): 29-35; 1974.* (18 references)

Miscible displacement techniques were used to study the movement of picloram through a water-saturated Norge loam soil. The equilibrium adsorption and desorption isotherms for picloram and Norge loam soil were not single-valued relations. Picloram mobility was reduced significantly when the average pore-water velocity was decreased from 145 to 14.2 cm/day. Observed and predicted effluent concentration distributions were compared. Predictions were made with a S/360 CSMP simulation model, using two kinetic rate equations and an equilibrium Freundlich equation. The two kinetic models and the equilibrium model each satisfactorily described the observed effluent concentration distributions at low pore-water velocities provided the non-single-valued character of the adsorption-desorption process was included in the calculations. At high pore-water velocieties, the kinetic adsorption models were found inadequate to predict the picloram movement. An empirical model was then developed, based on the assumption that equilibrium existed during displacement and that only a fraction of the soil participated in the adsorption process. This fraction was found to be a function of the average pore-water velocity. With the empirical model, a reasonable fit between data and calculated effluent curves was obtained for all pore-water velocities. (Author abstract by permission)

74-1580. Helling, C. S.; Thompson, S. M. (Agr. Environ. Qual. Inst., Agr. Res. Serv., U.S. Dept. Agr., Beltsville, MD 20705). **Azide and ethylenethiourea mobility in soils.** *Soil Sci. Soc. Amer. Proc. 38(1): 80-85; 1974.* (27 references)

A masking technique was developed for visualizing non-radioactive compounds on soil thin-layer chromatographic plates. To determine azide mobility, leached plates were sprayed with a kaolinite slurry in 95% ethanol, air-dried, and resprayed with 2% $Fe(NO_3)_3$ in 5% HNO_3. The average Rf of azide in four mineral soils was 0.87, and in a muck 0.21; it is thus quite mobile in most soils. The form of azide (NaN_3, KN_3, or KN_3 + K_2CO_3) did not affect mobility. 2-Imidazolidinethione (ethylenethiourea, or ETU), a degradation product of ethylenebis (dithiocarbamate) fungicides, was evaluated after masking with kaolinite + alumina (1:2), sprayed onto soil plates in 95% ethanol. Nitroprusside and Grote's reagents were useful chromogenic reagents. Mobility was also determined by autoradiography of [^{14}C]ETU; average Rf's for four mineral soils ranged from 0.83 to 1.00, decreasing to 0.61 in a muck. Although weakly adsorbed from solution, ETU is immobilized by drying the soil before leaching. 2-Imidazolidone (ethyleneurea) and possibly sulfur were detected in soil incubated 7 days with ETU. (Author abstract by permission)

74-1581. Laplanche, A.; Martin, G.; Richard, Y. (Lab. de Chimie des Eaux, Ecole Nat. Superieure de Chimie de

Rennes, Rennes, France). **Etude de la degradation des pesticides par l'ozone: cas du parathion. [Degradation of pesticides by ozone: the case of parathion.]** *Trib. CEBEDEAU (Cent. Belge Etude Doc. Eaux) 27(362): 22-26; 1974.* (15 references) (French)

Parathion suspended in water was degraded by ozone and the process studied. Ozonization was done in a bubbler at a rate of 2 g ozone per hour. Paraoxon, picric acid, 2,4-dinitrophenol, and phosphoric acid were identified as the metabolites of parathion by means of thin-layer chromatography and neutron magnetic resonance spectroscopy. The formation of paraoxon and elemental sulfur by the action of ozone was determined as the first step in the degradation. Paraoxon itself was also attacked by ozone to form nitrophenol compounds and phosphoric acid. However, the rate of degradation of paraoxon in acidic medium was smaller than the rate of oxidation of parathion.

74-1582. Yonova, I.; Tsvetkova, Ts.; Zhecheva, G. (Vet. Inst. of Infectious and Parasitic Diseases, Sofia, Bulgaria). **Termoustoychivost na DDT v meso ot ptiytsi i v yaytsa. [On the thermostability of DDT in eggs and poultry meat.]** *Vet. Med. Nauki 10(6): 39-44; 1973.* (12 references) (Bulgarian)

The thermal stability of DDT was studied in poultry meat and eggs. The chickens were fed 0.06 mg DDT per kg of body weight daily for 12 months. Cooking the meat for 150 min at 98 C reduced the total DDT content to 64-69.6% in meat and to 78% in fat. The final DDT contents were 0.987-0.990 mg/kg in meat and 1.180 mg/kg in fat against the respective initial levels of 1.75-1.8 mg/kg in meat and 1.9 mg/kg in fat. At the same time, the DDT level increased from 0.095-0.38 mg/kg to 0.145-0.42 mg/kg, and the DDE content rose from 0.178-0.21 mg/kg to 0.28-0.25 mg/kg. Cooking at 98 C for 180 min reduced the DDT contents in meat and fat to 60-61% and to 70% of the original levels, respectively. The efficiency of cooking at 200 C for 90 min was 27-31% in meat and 26% in fat; sterilization at 120 C for 40 min reduced the total DDT levels in meat and fat to 53-57.3% and 64.5%. Eggs cooked at 98 C for 3, 5, 10, and 15 min, reduced total DDT content to 92%, 86%, 75%, and 70% of the initial content. The reduction of the DDT content during heat treatment was due to its extraction with fat but also to metabolism to DDD (TDE) and DDE, as well as to more complete breakdown.

74-1583. Ponomarenko, N. S.; Talan, F. S.; Volynets, M. T. (Author address not given). **Kontrol' za yadokhimikatami v pishchevykh produktakh. [Inspection of food products for poisonous chemicals.]** *Voenno-Med. Zh. 2: 59-60; 1973.* (Russian)

Food products used by the army were inspected for pesticide and other poisonous residues. Some results of DDT residue determinations in vegetable products and human body fluids are presented. Out of 74 potato samples investigated for DDT residues, DDT was detected in 16 samples or 21%. Residues of DDT were also detected in 12 out of 66 cabbage samples, and in 19 out of 63 vegetable based dishes. The higher frequency of DDT occurrence in the latter may be due to contamination of foods of animal origin combined with the vegetables. The highest DDT concentrations in the potato, cabbage, and vegetable dish samples investigated were 0.2, 0.05, and 0.1 mg/kg against a maximum allowable residue concentration of 0.5 mg/kg. Subcutaneous fatty tissue samples from patients contained not more than 5 mg of DDT per kg. Blood and bile samples investigated showed a lower frequency of DDT contamination with residue levels ranging from 0.1-0.6 mg/kg.

74-1584. Vas'kovskaya, L. F. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Raspredeleniye DDT v organizme cheloveka. [Distribution of DDT in humans.]** *Vrach. Delo 1: 129-132; 1974.* (Russian)

The distribution of DDT and its metabolites in 27 different human organs and factors influencing this distribution were studied in 90 people between 20 and 80 years of age who had died of various diseases. The DDT and DDT metabolite concentrations ranged from 0.9-15.5 mg/kg. Residue levels were highest in fatty tissues and in bone marrow, and residues were found in 96% of all samples of the panniculus adiposus, 80% of liver samples, 75% of myocardium samples, and 51% of lung samples. The DDT residue levels in lungs, pancreas, lymph node, and cerebrospinal fluid were 4-8 mg/kg in males and 2-4 mg/kg in females. The DDT and DDE levels in the lymph nodes, gastric wall, and the panniculus adiposus were higher in urban residents than country ones although some levels in lungs and kidneys were higher in country residents. The DDT, DDE, and DDD (TDE) levels in the heart, kidney, liver, brain, and lungs ranged from 2-7 mg/kg in those 20-29 years old and 6-11 mg/kg in those 50-59 years old.

74-1585. Kolmodin-Hedman, B.; Palmer, L.; Gotell, P.; Skerfving, S. (Dept. Toxicol., Swedish Med. Res. Council, Karolinska Inst., Stockholm Sweden). **Plasma levels of lindane, *p,p'*-DDE and *p,p'*-DDT in occupationally exposed persons in Sweden.** *Work Environ. Health 10(2): 100-106; 1973.* (23 references)

The plasma levels of lindane, *p,p'*-DDE, and *p,p'*-DDT were determined by gas chromatography in 42 spraymen occupationally exposed to lindane, 23 pine and fir nursery workers and 14 fishermen occupationally exposed to DDT, and 32 controls. With the exception of two of the spraymen who were suffering from a lindane skin allergy, all of the subjects were clinically healthy. The plasma lindane levels in the spraymen differed significantly ($p<0.001$) from those of the unexposed

controls. The plasma DDE and DDT levels of the nursery workers did not differ from those of the spraymen or controls. However, fishermen working on the central Baltic Sea had plasma DDT levels four to five times higher than those found in the other groups. PCBs were found in the plasma of some of the fishermen; *p,p'*-DDT, DDD (TDE), and dieldrin were not found in any of the subjects tested. The plasma levels of DDT and its analogs in the Swedish subjects were lower than those reported among occupationally exposed persons in the United States.

74-1586. Yamada, T. (Nat. Inst. of Agr. Sci., Min. of Agr. and Forestry, Tokyo, Japan). **[On the residues of benthiocarb herbicide in paddy field soil and unpolished rice.]** *Zasso-Kenkyu (Weed Res.) 16: 14-19; 1973.* (7 references) (Japanese)

Six specimens of unpolished rice were harvested from paddy fields to which three kinds of herbicidal granular formulations had been applied experimentally. The formulations contained 10% benthiocarb; 7% of benthiocarb and 1.5% simetryne; or 6% benthiocarb and 1.5% 2,4-D. No residues of benthiocarb were detected by the method of extraction, clean-up, and FPD-gas chromatography which had a detection limit of 0.01 ppm and a recovery of 88-92%. Benthiocarb was detected at 0.4-0.6 ppm in the soils on which the rice had been grown. The residues indicate that about 4% of the applied benthiocarb remained in the upper layer (0-2 cm in depth) about 230 days after application. In a laboratory experiment benthiocarb was mixed with two kinds of soils at 4-100 ppm and the mixtures kept at 28 C in flooded conditions. Benthiocarb diminished nearly linearly with a half-life of more than three weeks; the disappearance was more rapid when the amount applied was reduced. Benthiocarb did not disappear when the soil had been sterilized, suggesting the significant effect of microorganisms.

See also 74-1589 74-1595 74-1597 74-1741 74-1774

74-1587. Davies, J. E. (Dept. Med., Univ. Miami Sch. Med., Miami, FL). **Recognition and management of pesticide toxicity.** *Advan. Intern. Med. 18: 23-38; 1973.* (65 references)

Classes of pesticides which cause special diagnostic and therapeutic problems are discussed. Organophosphates are involved in more human poisonings than any other class of pesticides. Initial diagnosis of organophosphate poisoning can be made only on clinical grounds although confirmatory diagnostic laboratory tests can be useful in the proper clinical setting. The essentials of treatment are: restoration of the airway and correction of hypoxia; atropine and oxime therapy; decontamination; and scene investigation and notification. Bipyridyl intoxication frequently involves either paraquat or diquat, and the clinical symptoms differ depending on whether the exposure was occupational or due to accidental or suicidal ingestion. Treatment in man attempts to limit the amount of material absorbed and promote the elimination of the chemical from the body. Organochlorine pesticides are both toxic and persistent. Poisoning symptoms are largely caused by CNS stimulation, but the liver, lungs, kidneys, and blood vessels are also affected. Organochlorine pesticides are soluble in fat, and traces of DDT and its metabolites have been detected in living matter from all over the world. Concentrations of DDT and its metabolites in adipose tissue vary according to geographical area, sex, race, and health, and are greater in persons with some diseases and reduced in persons taking certain drugs.

74-1588. Mounce, M.; Savage, E. P. (Colorado Dept. Health, Greeley, CO). **The epidemiology of aerial application accidents in the High Plains 1966-1969.** *Agr. Aviat. 15(4): 105-113; 1973.* (2 references)

Reports on 19 aerial pesticide application accidents which occurred on the high plains between 1966 and 1969 are presented. Over 68% of these accidents occurred during the months of June and July; the time of day varied greatly. The chemical used at the time of the accident was inconsequential. 2,4-D was involved in 11 of the total accidents and 8 of the 13 fatal accidents. Parathion or methyl parathion were invoved in three accidents, all of which were fatal. Dylox (trichlorfon) and 2,4,5-T were each involved in one fatal accident. Fatigue, inexperience, and carelessness were probably related to the accidents, but previous exposure of the pilot do pesticide chemicals was not. In two fatal accidents the pilot's cholinesterase levels were below normal, suggesting the possibility of causal influence from cholinesterase-inhibiting organophosphate pesticides.

74-1589. Olberg, R. (Abteilung Waldschutz, Forstliche Versuchs- und Forschungsanstalt Baden-Wuerttemberg, Wittental bei Freiburg/Breisgau, Germany). **Geaenderte Anwendungstermine fuer 2,4,5-T-haltige Herbizide im Walde. [Changes in the application dates of 2,4,5-T-containing herbicides in forestry.]** *Allg. Forstz. 29(13): 267; 1974.* (3 references) (German)

Application dates for 2,4,5-T-containing herbicides, such as Tormona and Top, have been changed for forestry use in West Germany. The herbicides may be applied before flowering or after ripening of wild berries rather than in June and July. This should prevent 2,4,5-T residues in ripe berries including wild strawberry, raspberry, and bilberry from exceeding the maximum allowable concentration of 0.05 ppm. Raspberries gathered in forests within 40 days after the application of 2,4,5-T-containing herbicides contained 0.05-22.2 ppm 2,4,5-T.

74-1590. Deeken, J. H. (Kansas City, MO). **Chloracne induced by 2,6-dichlorobenzonitrile.** *Arch. Dermatol. 109(2): 245-246; 1974.* (4 references)

Dichlobenil caused chloracne in six persons involved in the manufacture of Casoron. Symptoms were observed at different lag times for each individual, the longest being five months. Several hundred pinpoint open comedones and several closed comedones appeared on the forehead, masseteric, zygomatic, and suborbital regions, and occasionally an inflammatory papule or small pustule was noted. The usual forms of acne treatment did not produce improvement until the patient was withdrawn from contact with dichlobenil.

74-1591. Truhaut, R. (Commission de l'Alimentation, France). **Teneur des fruits et legumes en residues de pesticides. [Pesticide residue levels in fruits and vegetables.]** *Bull. Acad. Nat. Med. Paris 157(6): 417-418; 1973.* (French)

The draft of legislation regarding the maximum allowable pesticide residue concentrations on and in fruits and vegetables was submitted to the French National Academy of Medicine by the Ministry of Agriculture and Rural Development for critical review. Recommendations included that the term zero tolerance be abondoned since this cannot be measured. Instead, it should be replaced by a residue level which cannot be detected by the most sensitive analytical methods, about 0.01 mg/kg, and is in essence negligible. The draft order should also be submitted to the Supranational Scientific Commission of the European Economic Community so that it will be in agreement with their specifications.

74-1592. Knapp, M.; Ruessel, H. A. (Inst. fuer Geflugelkrankheiten, Tieraerztliche Hochschule Hannover, Hanover, Germany). **Gefahren fuer Greifvoegel bei der Moewenbekaempfung durch Chloralose. Nachweis einer Chloralosevergiftung bei zwei Bussarden. [Danger to birds of prey by the use of chloralose as a control agent for sea gulls. Detection of a poisoning of two buzzards.]** *Can. J. Zool. 51(9): 573-574; 1973.* (12 references) (German)

Chloralose poisoning was detected in two buzzards which died after feeding on sea gulls controlled with this substance. Chloralose levels of 130 ppm and 160 ppm in the crop content and 28 and 57 ppm in the liver were determined by thin-layer chromatographic and gas chromatographic methods. Pronounced plethora of the lung and necrosis of the hepatic tissue were found. In acute poisoning chloralose may cause death by lowering the body temperature to below the critical values, especially in cold weather.

74-1593. Hunt, G. L., Jr.; Hunt, M. W. (Dept. Population Environ. Biol., Univ. California, Irvine, CA 92664). **Clutch size, hatching success, and eggshell-thinning in western gulls.** *Condor 75(4): 483-486; 1973.* (12 references)

DDE may be responsible for eggshell thinning observed in western gulls on Santa Barbara and Channel Islands, but since no residue data is available, conclusions cannot be drawn. In the study area 11% of the clutches contained more than the average three eggs. Hatching success was much lower in these supernormal clutches. Eggshell thickness was significantly lower in clutches in which no eggs hatched than in those from clutches in which at least one egg hatched.

74-1594. Ehrenstorfer, S.; Guenther, H. O. (Staatliche Chemische Untersuchungsanstalt, Augsburg, Germany). **Pestizidrueckstaende in Huehnereiern und Eipulvern. [Pesticide residues in chicken eggs and powdered eggs.]** *Deut. Lebensm.-Rundsch. 70(3): 105-109; 1974.* (7 references) (German)

Fresh chicken eggs and powdered eggs were analyzed for organochlorine pesticide residues. A combined gas-chromatographic and thin-layer chromatographic method was used for quantitative analysis, and an IR spectroscopic method was used for qualitative analysis of DDT and its metabolites in powdered eggs. Whites of eggs contained 0.031 ppm lindane, 0.009 ppm BHC, 0.01 ppm heptachlor, 0.002 ppm heptachlor epoxide, 0.003 ppm aldrin, 0.008 ppm dieldrin, 0.002 ppm *o,p'*-DDT, 0.007 ppm *p,p'*-DDT, and 0.002 ppm *p,p'*-DDE. Yolks contained an average of 0.65 ppm lindane, 0.11 ppm BHC, 0.06 ppm heptachlor, 0.016 ppm heptachlor epoxide, 0.06 ppm aldrin, 0.03 ppm dieldrin, 0.005 ppm *p,p'*-DDT, 0.03 ppm *p,p'*-DDT, and 0.05 ppm *p,p'*-DDE. Powdered egg samples investigated contained lindane, *p,p'*-DDE, *o,p'*-DDT *p,p'*-DDT. The contamination of the eggs is most probably caused by contaminated feed in which 0.01 ppm BHC, 0.005 ppm lindane, 0.01 ppm heptachlor, 0.01 ppm aldrin, 0.01 ppm *o,p'*-DDT, 0.05 ppm *p,p'*-DDT, and 0.002 ppm *p,p'*-DDE were determined.

74-1595. Ramade, F. (Univ. a Paris-Sud, Paris, France). **Effets non intentionnels des traitements antiparasitaires: troubles physiopathologiques induits chez les oiseaux et les mammiferes. [Unintended effects of anti-pest treatments: physiopathologic abnormalities induced in birds and mammals.]** *Econ. Med. Anim. 14(1): 43-49; 1973.* (French)

Physiopathologic effects of pesticides on avian and mammalian species were studied. Pesticides, especially organochlorines, accumulate in the animals through the trophic chains and reach high concentrations in birds of prey and piscivorous bird species. Pesticide residue investigations of bird species in Great Britain determined organochlorine pesticide contents of 2.7 ppm in sparrow-hawks, 2 ppm in owls, 1.75 ppm in thrush, 0.5 ppm in wood-pigeon, 14 ppm in grey heron, 6 ppm in grebe, and 0.25 ppm in water hens. Mercury contents exceeded the maximum allowable levels by 800 times in pheasants in Sweden due to the ingestion of dressed seeds. Principal effects of small pesticide concentrations in birds are thinning and embrittlement of the eggshells, reduced number of eggs, and disturbances in the sexual functions caused by hormonal and endocrine system malfunctions and involving the hypothalamic-hypophyseal system. Semichronic poisoning of mice with aldrin and fenthion reduced the weight of the adrenals and the medullary catecholamine and vitamin C levels. Rats chronically poisoned with 25 ppm DDT had increased degradation rate of testosterone, 17-beta-estradiol, progesterone, and desoxycorticosterone.

74-1596. Zaugol'nikov, S. D.; Kochanov, M. M.; Loyt, A. O.; Stavchanskiy, I. I. (Author address not given). **Nomogrammy dlya ustanovleniya orientirovochnykh predel'no dopustimykh kontsentratsiy vrednykh veshchestv. [Nomograms for establishing maximum permissible concentrations of noxious substances.]** *Gig. Tr. Prof. Zabol. 18(1): 28-30; 1974.* (9 references) (Russian)

Nomograms were set up to establish approximate maximum permissible concentrations of noxious and toxic substances in workplace air and in water reservoirs used for water supply. Experimentally determined toxicity parameters and corresponding maximum allowable concentrations were linked using the method of multiple regression analysis. The LC50 and the maximum allowable concentrations in workplace air were correlated with a factor of +0.55. The LC50, LD50, and maximum allowable concentrations of chemical substances in water were correlated with the respective correlation factors of +0.62 and +0.64. Experimentally established maximum allowable concentrations of butyphos (DEF), dioxan, carbophos (malathion), metaphos (methyl parathion), and thiophos (parathion) are 0.2, 10, 0.5, 0.1 and 0.05 mg/m^3. The corresponding calculated values are 0.5, 63, 4, 0.08, and 0.04 mg/m^3. The calculated maximum allowable concentrations of these substances in water are 0.02, 0.2, 0.12, 0.2, and 0.002 mg/liter.

74-1597. Ubaydullayev, R. U. (Lab. Air Hyg., Uzbek Sci. Res. Inst. Sanit., Hyg. and Occup. Dis., Tashkent, USSR). **Gigiyenicheskaya otsenka nekotorykh pestitsidov, primenyayemykh v usloviyakh zharkogo klimate. [Hygienic evaluation of several pesticides used in a warm climate.]** *Med. Zh. Uzb. 8: 40-44; 1973.* (Russian)

Field measurements and animal tests are presented concerning the hygienic evaluation of small concentrations of milbex, hexachlorane (BHO), phosphamide (dimethoate), and phosalone, extensively used in cottonfields in the warm climate of Uzbekistan. Traces of these pesticides were detected in the air at distances of 500-1,000 m from the site of application when distributed by tractor, and at distances of up to 2,000 m when applied from helicopter. Milbex, hexachlorane, phosalone, and phosphamide were completely eliminated from the air in 4, 5, 6, and 7 days after application. People living within a radius of 500-1,500 m were able to smell pesticides for 4-5 days and complained about fatigue, headache, vertigo, nausea, and occasionally vomiting. The odor was said to be most intense during the morning and evening hours although the actual pesticides concentrations were highest during noontime due to intense evaporation. Blood cholinesterase activity was considerably reduced in children living within a 400 m-radius. Odor threshold tests and investigations of the brain electric activity in humans, as well as chronic inhalation tests performed with rats at high temperature permitted the daily maximum concentrations of milbex, hexachlorane, phosalone, and phosphamide to be determined as 0.01, 0.05, 0.01, and 0.003 mg/m^3, respectively.

74-1598. Czeizel, A.; Bao, T. V.; Szabo, I.; Ruzicska, P. (Lab. Human Genetics, Nat. Inst. Pub. Health, Budapest, Hungary). **Human chromosome aberrations in acute organic phosphorous acid ester (pesticide) intoxication.** *Mutat. Res. 21(4): 187-188; 1973.*

A significant increase in stable chromosome aberrations and chromosomal breaks was observed in analyses performed on 31 persons with acute organophosphate intoxication. The incidence of karyotyped cells, percentate of "Cs" cells, percentage of "Cu" cells, percentage of "B" cells, and percentage of nonmodal cells were all higher than in the controls at 2 to 5 days after intoxication and, although they decreased, remained higher 180 days after intoxication. A mutagenic effect of organophosphates may be indicated by these results.

74-1599. Yoder, J.; Watson, M.; Benson, W. W. (Environ. Protect. Agency, Idaho State Dept. Environ. Community Services, Boise, ID 83720). **Lymphocyte chromosome analysis of agricultural workers during extensive occupational exposure to pesticides.** *Mutat. Res. 21(6): 335-340; 1973.* (14 references)

Lymphocyte cultures from 42 pesticide applicators and 16 controls showed an elevated incidence of chromatid lesions in pesticide-exposed individuals during the spraying season. The number of gaps and breaks did not change appreciably in the control group between mid-winter and mid-summer, but the mean number of gaps per person almost doubled, and the mean number of breaks increased by a factor of 10 in summer samples of the exposed group. Those individuals who primarily applied herbicides had a higher incidence of chromatid lesions than those who worked with organophosphates.

74-1600. Anonymous. **Toxic insecticides to replace DDT: Project Safeguard.** *Natl. Clgh. Poison Control Cent. Bull. 5: 1-6; 1972.*

As of December 31, 1972, the general use of DDT in the United States will be banned except for usage for green peppers in the Del-Marva area and for onions and sweet potatoes in storage. Parathion and methyl parathion which are highly toxic and which are acutely hazardous to untrained applicators will be the chief substitutes for DDT. Many of the techniques and procedures used for application of DDT cannot be used for the more toxic replacement chemicals. Increased availability of the more toxic replacements presents a potential increase in the incidence of accidental poisoning in children and farm-dwellers. Because the DDT replacements are so toxic and are easily absorbed by all routes of administration, exposure to these compounds can occur in unique ways. The diversity of possible signs and symptoms of parathion poisoning can lead to incorrect diagnosis and delayed treatment. Poison control centers, hospitals, and physicians should be prepared to handle a greater number of cases of parathion poisoning. Parathion intoxication should be considered in any case of a child who experiences a sudden onset of severe symptoms without a readily recognized cause. Information is given regarding the clinical manifestations and treatment of organophosphate intoxication.

74-1601. Norman, C. (Author address not given). **Academy reports on Vietnam herbicide damage.** *Nature (London) 248(5445): 186-188; 1974.*

In the late 1960's, United States military forces sprayed nearly 19 million gallons of herbicides over nearly 9% of South Vietnam. The herbicides used consisted of a mixture of 2,4-D and 2,4,5-T or a mixture of 2,4-D and picloram or sodium cacodylate. According to a report by the National Academy of Sciences, the mangrove forests were affected most severely. Under natural conditions over 100 years will elapse before the mangrove area is reforested, although a massive reforestation program might restore the forests in 20-30 years. Close to 2.0 million cubic meters of merchantable timber was also lost; at least 12% of these forests will require a major assistance program for reforestation. Death among children, diarrhea, skin rashes, and abdominal pain among the Montagnard people following spray missions

and widespread death among their livestock were reported. The Academy's research team could not find conclusive evidence of a correlation between exposure to herbicides and birth defects in humans. There is some evidence that the incidence of cleft lip increased during the years of the heaviest herbicide spraying. Fish and shrimp samples taken in 1973 still showed traces of the dioxins, a contaminant of 2,4,5-T spray.

74-1602. Namba, T. (Maimonides Med. Cent., Brooklyn, NY). **Relative toxicity of malathion (cont.).** *N. Engl. J. Med. 290(6): 347; 1974.*

The discussion is continued on the propriety of listing the organophosphate malathion as a deadly chemical toxin together with parathion, sarin, and soman (see abstract No. 74-0086). Between 1958 and 1967, malathion caused 63 accidental or occupational poisonings and 10 deaths in Japan. During the same period there were 3311 accidental or occupational poisonings and 188 deaths due to parathion. Malathion is freely and widely available and parathion strictly controlled. Malathion is a relatively low potential hazard to humans, compared with parathion; sarin and soman are far more toxic than parathion. Malathion can be lethal if a sufficient amount is absorbed, but should not be grouped with parathion, sarin, and soman as a deadly chemical toxin.

74-1603. Kagami, M.; Kudo, Y.; Yokoi, T.; Nakamura, I.; Yamada, Y.; Kozukue, H.; Oshima, K.; Takamiya, Y. (Sch. of Hyg., St. Marianna Med. College, Japan). **[On the peripheral erythrocytic cellular change of inhabitants in a district.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 145; 1974.* (Japanese)

Erythrocytic cellular states in peripheral blood were examined in inhabitants of the eastern coast of the Izu Peninsula who engaged in flower culture. The results were compared to those from similar tests carried out in 1966 on farmers of Nagano Prefecture. Frequency of basophilic stippled erythrocytes (BSE) was fairly high. Basophilic stippled erythrocytes were found more frequently in farmers than in non-farmers (46:23); stippling rates higher than 0.05% occurred substantially more often in farmers (19:7). The phenomenon resembled the results obtained in Nagano Prefecture. Pesticides now in use in Izu are mainly the organophosphates as well as some organosulfates, antibiotics, and a few organochlorines. Drinking water did not contain traces of organomercury or organophosphorus compounds. It has been confirmed by animal experiments that DDT and BHC induce BSE, but organophosphates and organosulfates do not. The results in Nagano would have been due to DDT and BHC because the examination was carried out in 1966. The appearance of BSE in the present examination might be due to factors other than pesticides.

74-1604. Fujita, Y.; Goto, M.; Une, H.; Serizawa, T.; Ohira, M.; Aoyama, H. (Kochi Prefect. Health Cent. in Hatanishi Area, Kochi, Japan). **[On the Vinyl Green House Syndrome in the western part of Kochi Prefecture.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 204; 1974.* (Japanese)

One hundred and twenty farmers engaged in farming in vinyl green houses in Nakamura City of Kochi Prefecture were medically examined. Questionnaires, tests of grasping power, dorsal muscular power, vibratory sensation, and respiratory function; and examination of urine, ECG, and blood (RBC, WBC, Ht, Hb, GOT, GPT, Na, K, total protein, serum ChE) were used. The subjects were engaged in agriculture and rice cultivation and had an average age of 40. Of the green houses 5.1% were heated, 89% did not have ventilating fans, and 59% did not have rest rooms or lounges. Average work time in vinyl green houses was over nine hours per day. Those applying pesticides were men 94.7% and women 59.6%. Those complaining of pesticide related illness were 19.3%. The percentage of abnormally low ChE was 22.9%; that for anemia was 39.3% and for reduced dorsal muscular strength 43%. The percentages of abnormal pain sensation, of accentuated tendon reflex, and of dermal symptoms were respectively 38.5, 46.8 and 68.5. Health was influenced by high temperature and humidity and endangered by pesticide applications coupled with long working hours in a crouched position in narrow and unventilated vinyl green houses.

74-1605. Tsunenari, S. (Dept. Legal Med., Kumamoto Univ. Med. School, Kumamoto, Japan). **Studies on organic pesticide azomyte from forensic toxicological aspects.** *Nippon Hoigaku Zasshi (Jap. J. Legal Med.) 27(2): 123-125, 133; 1973.* (32 references)

Azomyte, composed of 38% azoxybenzene and 22% PPPS, had an LD50 in mice of 3089 mg/kg; mixtures of the two compounds higher in azoxybenzene were more toxic. Symptoms included reduced activities, clonic convulsions, ataxia, and irregular respiration. Histological findings differed slightly in the group of azomyte-treated animals which died early and those which died late. UV, TLC, and GC proved useful in determination of the components of the pesticide in stomach contents, liver, and cerebrum. Azomyte poisoning in a boy of 19 years produced no substantial symptoms within 15 hours; however, jaundice and sporadic unconsciousness were observed in 72 hours. In 96 hours he fell into hepatic coma, and in 140 hours he died of cardiac insufficiency.

74-1606. Kirchner, K. (3263 Exten bei Rinteln, Germany). **Zur Therapie von Vergiftungen mit organischen Phosphorsaeureestern bei Hunden. [Therapy of poisonings by phosphoric acid esters in dogs.]** *Prakt. Tierarzt 54(3): 97-98; 1973.* (5 references) (German)

Symptoms and therapy of acute poisoning by parathion and systox in dogs are described and three cases of poisoning reported. Miosis, hypersalivation, excessive bronchial secretion, pulmonary edema, dyspnea, bradycardia, colic, vomiting, liver damages, myoclonia, pareses, clonic-tonic spasms, ataxia, and asphyxiation are the typical symptoms of organophosphorus pesticide poisonings. Atropinization with an increased dose of 5 mg/kg of body weight and simultaneous administration of 10-20 mg/kg doses of toxogonin are recommended for therapy.

74-1607. Thompson, F. B. (50 Hillcrest Road, Hamilton, New Zealand). **Pesticide legislation in New Zealand.** *Residue Rev. 49: 131-151; 1973.* (42 references)

The Agricultural Chemicals Act and the Animal Remedies Act control the sale and use of pesticides in New Zealand which are used for plant and animal protection, respectively. In addition to the principal acts there are Amendment Acts, Regulations, and Notices. Regulations and notices administered by the Ministry of Agriculture and Fisheries state that specified agricultural chemicals may not be sold or used without a permit from the Ministry, or prescribe the conditions under which the materials may be applied without a permit. Some persistent organochlorine insecticides are not permitted to be used in agriculture, and others are permitted only if there is no other alternative material available to control the pest. The current policy regarding the issue of permits is to phase out the use of persistent organochlorine insecticides in agriculture and horticulture. Agricultural chemicals and animal remedies may not be sold except under labels accepted by the respective Boards. Each Board includes a member of the Ministry of Agriculture and Fisheries and the Department of Health and nominees of organizations representing manufacturers, users, and other interested parties specified in the respective Act. Each Board has a majority of non-government members and operates independently of government. Agricultural chemicals and animal remedies are also subject to legislation administered by the Department of Health. The Poisons Act and the Poisons Regulations contain provisions relating to the packaging, labelling, sale, storage, transport, and use of toxic chemicals for agricultural, horticultural, veterinary, medicinal, household, or industrial purposes. Other legislation prescribes tolerances for pesticide residues in foods. In general, these tolerances tend to follow those proposed by the *Codex Alimentarius* Committee on Pesticide Residues. (Author abstract by permission, abridged)

74-1608. Naito, M.; Kugimiya, K.; Endo, R. (Dept. Ophthalmol., Central Hospital of Self Defence Force, Tokyo, Japan). **[A consideration on the relationship between a child with minor nervous dysfunction with ocular disturbances and the intoxication by pesticides for agriculture.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1164-1165; 1973.* (Japanese)

Several neurological examinations were carried out on the outpatients in the ophthalmology department who had visual disturbances, visual field stenosis, abnormality in refraction, bulbar motor disturbance, and pupillar motor abnormality characteristic of pesticide intoxication. Biochemical examinations consisted mainly of determinations of erythrocyte ChE activity especially on a child with minor nervous dysfunction and such ocular disturbances. The relationship between the therapeutic efficacies of PAM and atropine and the results of the examination are discussed. Similar ocular disturbances were also seen in urban children where exposure to pesticides was not estimated. In some patients improvements of ocular and general neurological symptoms paralleled the value of ChE activity, increased by the treatment. However, there were cases where ocular and neurological symptoms appeared and ChE activity was not reduced. The possibility of causes other than pesticide intoxication should be considered. (Material presented at a lecture at Group Discussion on the Effect of Environmental Pollution and the Medico Originated Diseases on Eyes, Oct. 21, 1972, Yokohama.)

74-1609. Imai, H.; Ono, S.; Suzuki, H.; Terakado, R.; Ishikawa, T. (Sch. Ophthalmol., Fac. of Med., Kitasato Univ. Sagamihara, Japan). **[On the electroretinogram and the electrooculogram of patients intoxicated by organophosphorus pesticides.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1165; 1973.* (Japanese)

Diminished visual acuity and visual field stenosis frequently noted in patients intoxicated by organophosphorus chemicals are subjective and determined by question and answer. Therefore, these symptoms are not detectable in babies. ERG and EOG tracings were collected on patients strongly suspected of intoxication with organophosphorus chemicals. The locations of injury responsible for the above-mentioned ocular disturbances were discussed. Treatment included PAM and atropine. The ERG was recorded (scotopic) at T.C. of 0.3 and 0.03, and the EOG was decided by preocular, bright ocular, and dark ocular adaptations. Abnormal ERG tracings were found in known cases of positive intoxication by organophosphorus chemicals. There were also cases with disturbances on light rise. Changes in the abnormality of ERG and EOG after treatment with PAM and atropine were introduced.

74-1610. Taneda, M. (Kitasato Univ., Sagamihara, Japan). **[The electroencephalogram and psychoneurotic symptoms in chronic organophosphorus intoxication.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9):1165-1166; 1973.* (Japanese)

Two cases of chronic organophosphate intoxication in which improvement was noted were followed by

EEG and reported. Before treatment the EEG showed no conspicuous anomalies except for slightly slow alpha waves; however, the patients showed disturbances of gait and of muscular coordination, accentuation of tendon reflexes, pathological reflexes, and loss of sensory capacity, and ocular symptoms. After initiation of therapy improvement of ocular symptoms was followed by aggravation of the EEG as shown by an increase in theta waves with hyperventilation. This was followed by improvement of psychoneurotic symptoms and normalization of EEG sensory capacity. General improvement of the cases took eight to ten mmonths.

74-1611. Tsuchiya, T. (Miyazaki City, Japan). **[A report on the state of organophosphorus pesticide application and the cases considered to be intoxication by the pesticide in Miyazaki District.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1166; 1973.* (Japanese)

A mass examination was carried out on people engaging in vinyl-green house cultivation in southern Miyazaki where organophosphorus pesticides are used at a rate of about 32 kg/ha. Many persons were found with abnormally reduced activity of serum ChE probably caused by organophosphorus pesticides. Persons with abnormally reduced activity of serum ChE were found in a high percentage among the people who showed abnormal GOT, CPK, and anemia. The outpatient children with diminished visual acuity were screened by the criteria used for diagnosis of organophosphorus intoxication. Positive-reacting children were treated effectively with PAM and atropine.

74-1612. Ichii, S.; Kimata, K. (Moriguchi City, Japan). **[Results of treatment of ocular disease due to organophosphorus pesticides for agriculture and the prognosis.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1166; 1973.* (Japanese)

Organophosphate antidotes give excellent therapeutic results, and there are many cases in which a practitioner without sufficient equipment for performing examinations could use therapeutic trials with these drugs to aid in diagnosis of organophosphate poisoning. Cases of amblyopia and myopia due to organophosphorus pesticides and due to other causes, treated conventionally with vitamin B1 and organophosphate antidotes such as atropine in a cross-over test, and treated with steroids were compared. Data used for comparison included the vision changes (improvement of visual acuity), corneal radii of curvature, the value obtained by refractometer, and the prognosis.

74-1613. Oto, K. (Asama Hospital, Nagano Prefecture, Japan). **[Treatment of ocular disturbances due to organophosphorus pesticides used in agriculture.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1166; 1973.* (Japanese)

The prognosis for eye disorders due to organophosphorus pesticides is very good in cases in which the disorder is diagnosed early and is treated as soon as possible. However, it is frequently very difficult to differentiate such cases from pediatric neuropathological syndromes and psychogenic diseases or pseudomyopia. Under these circumstances, especially in poor medical centers without facilities for examination, evaluating the results of treatment is often important in tracing the cause. Experiences and examination results from cross-over tests with treatment by Vitamin B1, atropine, and PAM are described in patients with known history of organophosphorus pesticide application.

74-1614. Takahashi, S.; Moroji, T.; Yamauchi, T. (School of Psychopathology, Faculty of Med., Hokkaido Univ., Sapporo, Japan). **[A case of methyl bromide intoxication which showed paroxysmal abnormal EEG.]** *Rinsho Noha (Clin. Electroencephalogr.) 15(11): 725; 1973.* (Japanese)

A 24-year-old man who had been engaged in fumigation of lumber with methyl bromide since age 19 sometimes had a slight headache after finishing his job. After finishing work on April 7, 1973, he felt very dizzy and sat down. This feeling disappeared, but about five days later, numbess appeared on both soles. The hypesthesia went up to his waist in a few days, resulting in unsteady gait and necessitating hospitalization on May 2. Neurologically, disappearance of both ankle jerks, tossing of the whole body when eyes were closed, severe peripheral hypesthesia below the waist, hyperalgesia, and weakness of vibratory sensation were noted. Laboratory findings were: serum CPK 125 U, SGOT 51 U, CSF chloride 896 mEq/l(NaCl). After one month of hospitalization the hypesthesia localized to the bottom of the heel, and the vibratory sensation became normal; abnormalities of serum and cerebrospinal fluid had disappeared. Findings on EEG were: at the time of hospitalization, irregular alpha waves of 9.5-10 Hz and 40-60 μV predominated in the occipital region during rest, and with monopolar drive a slight general alpha-like pattern was seen, sometimes with large waves conspicuous in the background. Continuity was better on the left side. Slow waves of 7 Hz and 30-40 μV were occasionally seen in the frontal and temporal tracings. Once, a slow wave of 5.5-6 Hz and 80-100 μV suddenly appeared in all fields, especially in the frontal hemisphere, accompanied by small spikes, appearently representing an unstable complex of spike and slow wave. After two weeks there was no such abnormality. After three weeks, when the hypesthesia had localized to the sides of both legs, a group of unstable complexes of slow and spike of 5 Hz and 80-100 μV appeared all over the field, 11 seconds after injecting 70 mg of Bemegride. The patient felt a transient dizziness at the time.

74-1615. Ishihara, O.; Onuma, T.; Fukushima, H. (Sch. of Psychoneurol., Fac. of Med., Hirosaki Univ., Hirosaki

City, Aomori, Japan). **[A case of peripheral neurosis by intoxication due to a pesticide, trichlorfon.]** *Rinsho Shinkeigaku (Clin. Neurol.) 14(1): 57; 1974.* (Japanese)

A 42-year-old man swallowed about 20 ml of a trichlorfon solution in a suicide attempt and was delirious for a few days. After about half a month, following pains in legs, he suffered almost complete paralysis in the extremities, especially the legs. Noticeable atrophy of fingers and calf muscles developed afterwards with no marked paresthesia. A neurogenic pattern was shown in electromyogram. Conductance velocity in ulnar nerves was normal and that in median and posterior tibial nerves could not be determined. Biopsies of sural nerve and peroneus revealed denaturation of nerve fiber and musular atrophy. Serum cholinesterase was depressed. The symptoms and course are similar to those reported in another case of trichlorfon intoxication. (Presented at XII Tohoku Local Meeting of Jap. Soc. Neurology, Feb. 15, 1973, at Sendai)

74-1616. Ooishi, S. (Ehime Rosai Hospital Matsuyama City, Ehime, Japan). **[Industrial intoxication and workers eyes.]** *Rodo Eisei (Ind. Hyg.) 15(2): 50-52; 1974.* (Japanese)

Ocular findings in cases of industrial intoxication are discussed. Several industrial toxicants such as CO, Hg, As, and pesticides cause ocular impairments (similar to ones produced by organophosphorus pesticides) such as impaired vision; visual field stenosis in children; retinal conjuctivitis, optic neuritis, and atrophy of optic nerve resulting in astigmatism, accompanied by impaired liver function and drop in serum cholinesterase. The major complaints of parathion applicators were attributed to the high temperature and humidity of the application season in July and August; a slight drop in cholinesterase activity just after the application did not coincide with clinical symptoms. Blindness in cattle occurring in 1969-1971 in Ehime Prefecture has been attributed to organophosphorus pesticides, but may have been caused by ocular neuritis due to lack of Vitamin B in the feed. Unless the pollutant is definitely known, ophthalmologists should not diagnose subjective symptoms such as postbulbar neuritis or toxic amblyopia after only a few examinations.

74-1617. Anonymous. **The plight of the pelicans.** *Sea Secrets 18(1): 8-9; 1974.*

DDT, DDE, and polychlorinated biphenyls are concentrated in the bodies of pelicans feeding off fish living in polluted waters. The chemicals cause the shells of the birds' eggs to be too thin to support the weight of the adult bird during incubation. Due to the drastic decline of brown pelicans in Texas, South Carolina, California, and Louisiana, this bird has been declared an endangered species by the Department of the Interior. The pelican is endangered by solid waste pollution, fishermen, and disturbances created by human visitors, as well as chemicals. Over 2,500 brown pelicans have been banded and color marked in Florida and South Carolina; persons sighting these birds should report the date and place the bird was sighted.

74-1618. Roujeau, J.; Pfister, A.; Nogues, C. (Service Central d'Anatomie et Cytologie Pathologiques, Groupe Hospitalier Lariboisiere, Paris, France). **Conclusions histogenetiques sur les fibroses interstitielles diffuses. [Histogenetic conclusions concerning diffuse interstitial fibrosis.]** *Sem. Hop. 49(27): 1995-1999; 1973.* (French)

The action mechanisms of paraquat, ozone, oxygen, X-ray, and bleomycin in the production of interstitial edema, an essential process in the development of diffuse interstitial fibrosis, are discussed. When injected parenterally, paraquat always caused acute lesions, including interstitial edema, and alterations of endothelial cells and of type I and II pneumocytes. Acute poisonings by inhaled paraquat, however, caused no irreversible changes in the respiratory mucosa. The action of paraquat is related to reduction of the dipyridyls to free radicals. Other causative agents of interstitial edema do not cause direct lesions; rather, they cause cellular alterations (blockade of NAD in type II pneumocytes) which lead to suppression of surfactant excretion and consequently to modifications of the tension equilibrium between the capillary lumen and the interstitial tissue.

74-1619. Lamisse, F.; Gautier, J.; Breteau, M.; Bagros, P.; Ginies, G.; Geslin, N. (C.H.R. Bretonneau, Service de Reanimation Respiratoire, Tours, France). **Intoxications accidentelles et volontaires. [Accidental and intentional poisoning.]** *Sem. Hop. 49(42): 2757-2768; 1973.* (4 references) (French)

Seven hundred fifty-seven cases of toxic coma due to acute, accidental, or voluntary poisoning with drugs, pesticides, and other poisonous substances from 1967-1972 are analyzed. Parathion, a strychnine preparation (taupicine), antimony with arsenious acid, dieldrin, and dicoumarol were responsible for 8, 4, 2, and 2 cases of poisoning, respectively. One case each was due to ingestion of chloralase, aldrin, cuprosan (copper oxychloride), a nitrophenol-derived herbicide (herbal), sodium chlorate, sevarol, and temtidine. Six out of the 25 cases of poisoning by agricultural pesticides were accidental, the rest being intentional. Disturbances in consciousness were absent in 68% of all poisonings by agricultural pesticides; sleep on admission was determined in 4%, vigil coma in 8%, and deep coma in 16%. Hypothermia, hypertension, and convulsions were observed occasionally. Lethality was 2.5% relative to the 757 cases. Nine patients, including one poisoned by parathion, were dead on arrival in the hospital.

74-1620. Reagor, J. C. (Texas Vet. Med. Diagnostic Lab.). **Arsenic poisoning in cattle.** *Southwest. Vet. 26(4): 295-296; 1973.* (8 references)

During 1972, 53 cases of arsenic poisoning among cattle were reported to the Texas Veterinary Medical Diagnostic Laboratory. Seven sources of arsenic were found, all of the sources having been used as agricultural chemicals at one time. The most common sources were arsenic acid which is widely used in Texas as a cotton defoliant. The next most common source was sodium acid methanearsonate which is used as a selective herbicide in cotton and turf. The only other significant source was calcium arsenate which was used as an insecticide at one time and is now used occasionally as an herbicide. The other sources were dipping vat solutions, old dip cans, sodium arsenate, and arsenic trioxide. The levels of arsenic in the livers of the poisoned animals varied from 3.5 to 60.4 ppm by weight. In no instance was the poisoning traceable to arsenic compounds which had been used in the proper way.

74-1621. Anonymous. **Stricter controls for paraquat sales.** *Vet. Rec. 94(9): 193; 1974.*

In Great Britain the Home Secretary has accepted the recommendation of the Poisons Board for stricter controls on the sale of the weed killer paraquat. Beginning March 1, 1974, paraquat may be sold by a pharmacist or a listed seller registered with the local authority. The pesticide can be sold only to persons who are engaged in agriculture or horticulture. Granular preparations containing less than 5% paraquat salts are not affected by this ruling.

74-1622. Mizyukova, I. G.; Petrun'kin, V. Ye. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Unitiol i mekaptid kak antidoty pri otravleniyakh mysh'yakododerzhashchimi veshchestvami. [Unithiol and mecaptid as antidotes in poisonings with arsenic-containing substances.]** *Vrach Delo. 2: 126-129; 1974.* (11 references) (Russian)

The mechanisms of action and the efficiencies of unithiol, dicaptol, and mecaptid as antidotes in poisonings by arsenic-containing substances in general, and by hydrogen arsenide in particular, are described. Dicaptol and especially unithiol are highly efficient antidotes in poisonings with the majority of arsenic-containing substances in which arsenic is present in oxidized form such as arsenites, arsenates, alkylarsenoxides, arylarsenoxides, arsenic and arsenious anhydrides. However, dicaptol and unithiol are inefficient and even contraindicated in the therapy of acute poisonings with hydrogen arsenide. Mecaptid is a highly efficient specific antidote for hydrogen arsenide. Mecaptid readily penetrates to the erythrocytes, the site of action of this substance, and forms compounds with disulfide groups which in turn oxidize hydrogen arsenide and convert it into low-toxic thioarsenites rapidly eliminated in the urine. Unithiol, accelerating the elimination after oxidation, may be useful in the therapy of hydrogen arsenide poisonings on the fifth to seventh days.

74-1623. Kazakevich, R. L. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, and Plastic Materials, Kiev, USSR). **Sostoyaniye nervnoy sistemy u imeyushchikh dlitel'nyy professional'nyy kontakt s geksakhlortsiklogeksanom i iskhodnymi produktami yego sinteza. [State of the nervous system in persons with a prolonged professional contact with hexachlorocyclohexane and products of its synthesis.]** *Vrach. Delo 2: 129-133; 1974.* (17 references) (Russian)

The functional status of the nervous and hepatobiliary-pancreatic systems was studied in subjects with prolonged occupational exposure to hexachlorocyclohexane (BHC) and to the initial substances (chlorine, benzene, and chlorobenzene) used for its synthesis. Headache, vertigo, irritation of the skin and the eyes and of the respiratory mucosa, vegetative-vascular and asthenic syndromes, toxic encephalopathy, vegetative-sensory polyneuritis, and, in some cases, diencephalic syndrome were observed along with acrocyanosis, acrohypothermia, and acrohyperhydrosis. Dysproteinemia, hypoalbuminemia, and hyperglobulinemia are indicative of the involvement of the carbohydrate and protein metabolism, and depression of the functional state of the hypothalamo-pituitary-adrenal system was noted. The findings indicate a direct effect of hexachlorocyclohexane on the nervous system and involvement of the hepato-biliary-pancreatic system.

74-1624. Section of Drug Administration (Pharmaceutical and Supply Bureau, Japan Ministry of Health and Welfare, Tokyo, Japan). **[Forwarding of the List of Pesticide Accidents for 1972 to the chief of hygiene administration for all the prefectures, June 12, 1973.]** *Yakumu Koho (Pharmaceut. Gazette) 8766: 5-7; 1973.* (Japanese)

Data on accidents due to agricultural pesticides, detailing instances involving application, misuse, suicide, and homicide, including both fatal and nonfatal cases, was published by the Japan Ministry of Health and Welfare. The pesticides listed separately included parathion, EPN, malathion, endrin, and diquat. Distribution by prefectures was shown. The total number of intoxication cases for 1972 was 1061, including 572 fatal cases. Suicide and homicide, as usual, accounted for the largest number of fatalities, 545; there were only 4 fatalities among applicators, but the intoxication rate was high among applicators (32%). This figure would be even higher if individual case reports were properly presented by the intoxicated individuals.

74-1625. Ishcukova, M. P. (Author address not given). **Kliniko-funktsional'nyye izmeneniya pecheni u bol'nykh s khronicheskoy intoksikatsiyey yadokhimikatami. [Clinical-functional examination of the liver in chronic pesticide poisoning patients.]** *Zdravookhraneniye 5: 19-23; 1973.* (Russian)

Clinical and functional changes in the liver and

other organs were studied in 62 21-60-year-old male and female patients with occupational exposure to organochlorines, organophosphates, organomercurials, arsenicals, fluorine- and copper-containing compounds, carbamates, and nitrophenols for 1-21 years. Most complaints were caused by lesions of the nervous system, and diagnoses were made of toxic hepatitis in 56 cases, dyskinesia of the biliary duct in 24 cases, sympathetic-ovascular dystonia in 34 cases, polyneuritis in 22 cases, lumbosacral radiculitis in 18 cases, and encephalopathy in 7 cases. Reduced erythrocyte level in 21 cases, reduced color index in 45 cases, reduced leukocyte level in 30 cases, eosinophilia in 16 cases, lymphopenia in 18 cases, and monocytosis in 20 cases were determined. Reduced rate of hippuric acid excretion in 20 cases, and disturbed protein synthesis were seen in 40 cases in the group of 52 patients with clinically confirmed hepatitis, and in 10 cases in the group without ascertained hepatitis. Bilirubin levels were elevated in both groups. The aldolase activity was slightly elevated in 8 cases in the first group; the SGOT activity was elevated in 5 cases, and the SGPT activity in 6 cases. Thiophos residues were measured up to 10 gamma and more in the blood in 31 cases. Mercury residues were 0.02-0.8 mg/liter in the urine in 33 cases. In both groups inflammation in the gallbladder, inhibition of the growth of the bacterial flora in the bile, and pathologic changes in the hepatobiliary excretion occurred. Functional changes of the polygonal and Kupffer's cells were found in those with hepatitis, but changes in the liver function occurred in patients without clinical manifestions of hepatitis.

See also 74-1524 74-1538 74-1552 74-1568 74-1760

74-1626. Salama, A. M.; Mostafa, I. Y.; El-Zawahry, Y. A. (Botany Dept., Fac. Sci., Cairo Univ., Cairo, Egypt). **Insecticides and soil microorganisms I. Effect of dipterex on the growth of *Rhizobium leguminosarum* and *Rhizobium trifolii* as influenced by temperature, pH and type of nitrogen.** *Acta Biol. (Budapest) 24(1-2): 25-30; 1973.* (13 references)

Concentrations of dipterex (trichlorfon) above $10^{-3}M$ suppressed the growth of *Rhizobium leguminosarum* and *Rhizobium trifolii* and caused a shift in the optimum temperature from 30° to 25°. In the presence of dipterex growth was much more intensive with $(NH_4)_2SO_4$ than with $NaNO_3$. Optimum pH values were shifted downward for both organisms by dipterex, and a protective effect of ammonium nitrogen against dipterex was observed at almost all pH values.

74-1627. Kolberg, J.; Helgeland, K.; Jonsen, J. (Dept. Microbiol., Dental Fac., Univ. Oslo, Oslo, Norway). **Binding of 2,4-dichloro- and 2,4,5-trichlorophenoxyacetic acid to bovine serum albumin.** *Acta Pharmacol. Toxicol. 33(5-6): 470-475; 1973.* (14 references)

Both 2,4-D and 2,4,5-T were extensively bound to defatted bovine serum albumin (BSA), 2,4,5-T to a greater extent than 2,4-D. Scatchard plots of the binding showed that BSA contained at least two classes of binding sites for the herbicides. Addition of seven moles of palmitic acid to one mole of defatted BSA resulted in a decrease from 7.1-8.3 to 4.4-4.8 moles of bound 2,4-D. The results suggest that the free fatty acid concentration in blood may alter the capacity of albumin to transport phenoxy herbicides in the organism.

74-1628. Chopra, B. K.; Collins, L. C.; Osuji, F. (Dept. Biol., Prairie View A & M Coll., Prairie View, TX 77445). **Effects of cotoran (1,1-dimethyl-3-α,α,α-trifluoro-*m* tolyl urea) on the growth of *Aspergillus flavus* in soil and liquid culture.** *Acta Phytopathol. 8(1-2); 43-47; 1973.* (8 references)

The effect of cotoran (fluometuron) on the growth of *Aspergillus flavus* was studied in soil and liquid cultures. In liquid cultures the growth of the fungus increased with increasing herbicide concentration, as indicated by the increased mycelial dry weight. In soil cultures the production of carbon dioxide increased with increasing herbicide concentration and also with time. The pH decreased with increasing herbicide concentration, while the utilization of inorganic phosphorus was not significantly affected. Field rate concentrations of fluometuran would not enhance the growth of *A. flavus.*

74-1629. Sobonya, R. E.; Kleinerman, J.* (Div. Pathol. Res., St. Luke's Hospital, Cleveland, OH 44104). **Recurrent pulmonary edema induced by α-1-naphthyl thiourea.** *Amer. Rev. Resp. Dis. 108: 926-932; 1973.* (19 references)

Administration of 2.5 or 3.5 mg ANTU (α_1-naphthyl thiourea) per kg to rats every two days produced large amounts of pulmonary edema on the first day, with progressive reductions in edema up to the 5th day. Pulmonary edema was of the same magnitude over a 4-day period when ANTU was administered at 3.5 mg/kg daily, and the severity of edema was related to the size of pleural effusions. Mild pulmonary edema and small effusions were produced by 1 mg/kg ANTU. In these animals 3.5 mg/kg ANTU on day 3 produced edema of the same magnitude as that produced by initial administration of 3.5 mg/kg ANTU. Alveolar and interstitial edema decreased progressively with repeated doses, the former at a more rapid rate. Initial injection of ANTU produced hemoconcentration and hypoproteinemia, which decreased with subsequent doses.

74-1630. Slem, G.; Ayan, Y.; Baykal, E. (Dept. Ophthalmology, Ataturk Univ., Fac. Med., Ezurum, Turkey). **Experimental study on the effects of insecticides on the rabbit eye.** *Ann. Ophthalmol. 4(10): 874-875; 1972.* (2 references)

DDT, PMA, Basudin (diethyl isopropylmethyl pyrimidinyl), Hektion (*S*-1,2-*bis* ethyl-O,O dimethylthiophosphate), Korcide (*q*-benzene hexachloride), or copper sulfate was applied thrice daily for 1 or 5 days to a single eye of each of 90 rabbits. When high concentrations of insecticides were applied for prolonged periods of time, lesions of varying severity, including phthisis bulbi, developed. Few corneal and conjunctival lesions resulted from the application of weak concentrations for short periods of time. These lesions disappeared spontaneously. Since these insecticides may cause severe ocular complications, eyes should be protected from exposure to the chemicals.

74-1631 Fuchs, V.; Kuehnert, M. (Sektion Tierproduktion und Veterinaermedizin, Karl-Marx-Universitaet Leipzig, Leipzig, DDR). **Zum DDT- und Fluoridgehalt in den Organen der Ratte bei experimentellem subchronischen Vergiftungsverlauf. [Content of DDT and fluoride in the organs of rats in experimental subchronic poisoning.]** *Arch. Exp. Veterinaermed. 27(4): 667-674; 1973.* (26 references) (German)

DDT and fluoride residue levels were determined in various organs of male and female Wistar rats and fetuses after daily oral administration of 200 ppm DDT and 45 ppm fluoride for 90 days. The background values of *p,p'*-DDT in the gastrointestinal content, in the liver, total fat, and brain were 0.02 ppm, 0.25 ppm, 3.8 ppm, and 2.4 ppm. Fetal liver and brain contained 0.2±0.08 μg and 1±0.8 μg of *p,p'*-DDT per kg. The gastrointestinal content contained 8 μg of *p,p'*-DDT after 10 days, 1.25 μg after 50 days, and 2.5 μg/kg after 90 days. The *p,p'*-DDT contents in the liver, total fat, and brain were 0.2

μg/kg, 100 μg/kg, and 2.5 μg/kg after 10 days; 0.5 μg/kg, 6.25 μg/kg and 9 μg/kg after 50 days; and 1.5 μg/kg, 1,750 μg/kg, and 19 μg/kg after 90 days. The *p,p'*-DDE contents in the liver and total fat were 0.1 μg/kg and 2 μg/kg after 10 days, 0.1 μg/kg and 65 μg/kg after 50 days, and 0.5 μg/kg and 250 μg/kg after 90 days. The test animals did not differ from the control group physiologically. The fluorine concentrations in long bones of the test animals were 1,520 ppm, 1,931 ppm, and 2,033 ppm after 30, 60, and 90 days against a control value of 410 ppm. The corresponding fluorine contents in the mandible were 1,083 ppm, 1,456 ppm, and 1,535 ppm against a control level of 380 ppm.

74-1632. Golbs, S.; Kuehnert, M. (Sektion Tierproduktion und Veterinaermedizin, Karl-Marx-Universitaet Leipzig, Leipzig, DDR). **Fermentdiagnostische und haematologische Untersuchungen der experimentellen Alkylphosphatestervergiftung an der Ratte. [Diagnostic enzyme tests and hematological studies on rats experimentally poisoned with alkylphosphate esters.]** *Arch. Exp. Veterinaermed. 27(4): 683-690; 1973.* (18 references) (German)

Enzymatic and hematologic changes due to a single, orally administered LD50 dose of methylparathion (8.5±1.1 ppm for females, and 5.8±1.1 ppm for males) were studied in Wistar rats in a 48 hr-experiment. The hemoglobin levels ranged from 10.7 to 14.0 g/100 ml during the entire test against a control level of 15.2 g/100 ml. Blood glucose levels and the SGOT and SGPT levels increased, and the acetylcholinesterase activity level decreased (53.4-78.3 microliter CO_2 against a control value of 104.1 microliter CO_2). The erythrocyte count normalized after a temporary decrease, while the leukocyte count remained substantially below the control level during the experiment. The hematocrit value decreased from 52% to 36.3-49.5%. The percentage of myelocytes with rod-shaped nuclei temporarily increased, the percentages of neutrophils with segmented nuclei and monocytes increased, and the eosinophil and lymphocyte counts decreased.

74-1633. Rodica, G.; Stefania, M. (Dept. Animal Physiol., Biol. Research Center, Cluj, Rumania). **Untersuchungen ueber die Wirkung einiger Insektizide auf die Bursa fabricii bei Kueken. [Effects of some insecticides on the bursa of Fabricius in chicks.]** *Arch. Exp. Veterinaermed. 27(4): 723-728; 1973.* (14 references) (German)

Changes in the protein levels and in transaminase activities in the bursa fabricii were studied in chicks daily fed 1 ppm heptachlor or 1 or 0.5 ppm fenchlorphos from the third till the eight weeks of their lives. The total nucleic acid level remained unchanged in the fenchlorphos-treated groups, but decreased in the group treated with heptachlor. The RNA level decreased in the heptachlor-treated group and increased in the fenchlorphos-treated groups. The DNA level decreased in all groups. The SGOT activity sharply increased in the group treated with 1 ppm fenchlorphos, and was slightly reduced in the two other groups. The SGPT activity decreased in the fenchlorphos-treated groups, but remained unchanged in the group treated with heptachlor. The total protein level increased in the heptachlor-treated group and decreased in the other groups. The amino nitrogen level insignificantly increased in all groups. The weight of the bursa fabricii was 28% higher in the heptachlor-treated chicks, and 39% (1 ppm) and 49% (0.5 ppm) greater in the fenchlorphos-treated groups than in the control group.

74-1634. Magnus, I. A. (Author address not given). **Die Bedeutung der Lysonsomen fuer die Photosensibilisierung der Haut durch Porphyrine und andere Sensibilisatoren. [Significance of lysosomes for cutaneous photosensitization by porphyrins and other sensitizers.]** *Arch. Klin. Exp. Dermatol. 237: 484-486; 1970.* (German)

Studies indicating the significance of the lysosomes in the cutaneous photosensitization by porphyrins and other skin sensitizers are reviewed. Photosensitization of the skin is produced by such substances as hematoporphyrin and such porphyrinogenic substances as hexachlorobenzene and 3,5-diethoxycarbonyl-1,4-dihydrocollidine (DDC). Photosensitization appears after several months of treatment with hexachlorobenzene. Hydrolytic enzymes released by lysosome disintegration are apparenty responsible for the production of the skin-damaging compounds.

74-1635. Gordiyenko, V. M.; Kozyritskiy, V. G. (Lab. of Morphol. and Histochem., Res. Inst. of Endocrinol. and Metabolism, Kiev, USSR). **Izmeneniye ul'trastruktury kory nadpochechnikov sobaki posle kratkovremennogo i dlitel'nogo vvedeniya *o,p'*-DDD. [Alterations in the ultrastructure of the adrenal cortex of the dog after short-term and long-term administration of *o,p'*-DDD.]** *Arkh. Anat. Gistol. Embriol. 65(7): 90-95; 1973.* (9 references) (Russian)

Effects of various doses of *o,p'*-DDD (TDE) administered orally on the ultrastructure of the dog adrenocortical layer were studied. Short-term administration (3 days) of daily 10 mg/kg-doses of *o,p'*-DDD did not induce changes in the cytoplasmic structures of the adrenocortical layer. However, administration of *o,p'*-DDD for 22 days resulted in pronounced changes, indicating the damaging effect of this dose on the cells of the reticular and fascicular zones. Mitochondria appeared swollen and the form of the nuclei and of the endoplasmic reticulum altered. An increased dose of 25 mg/kg caused alterations of the adrenocortical cells as early as the third day of the treatment and resulted in swelling of the mitochondria, clearing of the matrix, and reduced amount of cristae. Long-term administration of

25 mg/kg caused sharp destructive changes in all cytoplasmic structures, but the degree of the damage to various cells was not similar even within the same zone. Administration of 50 mg/kg daily resulted in complete destruction of the reticular and fascicular areas and their replacement by connective tissue.

74-1636. Hughes, R. D.; Millburn, P.; Williams, R. T. (Dept. Biochem., St. Mary's Hosp. Med. Sch., London W21PG, England). **Biliary excretion of some diquaternary ammonium cations in the rat, guinea pig and rabbit.** *Biochem. J. 136: 979-984; 1973.* (20 references)

The extent of the extraction in the bile and urine of the ^{14}C-labeled dications, diquat, paraquat, morfamquat, decamethonium and dimethyltubocurarine in bile-duct-cannulated rats, guinea pigs, and rabbits was examined. These compounds were excreted unchanged in bile and urine, except diquat, which was metabolized to a significant extent (18% of the dose) in the rabbit only. The extent of the biliary excretion of diquat (mol wt. of ion 184), paraquat (186), decamethonium (258), and morfamquat (469) was less than 10% of the dose in the three species, whereas that of dimethyltubocurarine (653) was greater than 10% in the rat and rabbit but not in the guinea pig. These results together with data from the literature suggest that the molecular weight at which the excretion of dications in the bile exceeds 10% of the dose is in the region of 500-600, which differs from the values for monocations (Hughes et al., 1973) and anions (Millburn et al., 1967; Hirom et al., 1972). (Author abstract by permission)

74-1637. Rose, M. S.; Crabtree, H. C.; Fletcher, K.; Wyatt, I. (Imperial Industries Ltd., Industrial Hygiene Res. Lab., Cheshire, England). **Biochemical effects of diquat and paraquat: disturbance of the control of corticosteroid synthesis in rat adrenal and subsequent effects on the control of liver glycogen utilization.** *Biochem. J. 138(3): 437-443; 1974.* (37 references)

Diquat and paraquat were administered to male Alderley Park specific-pathogen-free rats and mice which had been starved for 24 or 48 hours. Both pesticides prevented the depletion of liver glycogen which occurs in normal animals after starvation. The two agents also caused a rapid rise in blood glucose, which fell to control values after seven hours. The diquat-induced increase was greater than the paraquat-induced increase. The administration of diquat to adrenalectomized rats resulted in a small increase in blood glucose followed by hypoglycemia. The increase in blood glucose after diquat administration in hypophysectomized rats was smaller than in intact animals, but the overall response was very similar. Both pesticides greatly increased the plasma corticosteroid levels; these levels remained high for at least 24 hours, while the plasma adrenocorticotrophin (ACTH) levels remained elevated for only four hours. Diquat also increased the levels of adrenal cyclic AMP, which remained elevated for at least 24 hours. The data indicates that both diquat and paraquat increase the response of the adrenal cortex to ACTH.

74-1638. Udagawa, T.; Miyata, T.; Saito, T. (Sch. of Appl. Entomol. and Nematol., Fac. of Agr., Nagoyoa Univ., Nagoya, Aichi, Japan). **[Metabolism of ^{14}C-pyridafenthion, *O,O*-diethyl-*O*-(3-oxo-2-phenyl-2H-pyridazine-6-yl) phosphorothioate, administered for continuous three weeks, to mouse.]** *Bochu Kagaku (Sci. Pest Contr.) 39(1): 15-18; 1974.* (5 references) (Japanese)

A mixture of ^{14}C-pyridafenthion, *O,O*-diethyl-*O*-(3-oxo-2-phenyl-2H-pyridazine-6-yl) phosphorothioate (labeled in 3 and 6 positions in the pyridazine ring) and unlabeled pyridafenthion (1:1) was administered through a stomach tube to two groups of ICR-JCL male mice. The mixture was given to the first group for three continuous weeks at a rate of 20 mg/kg/day and to the second group at the same dose but only once each week. Excretion of ^{14}C-pyridafenthion in the urine and feces and accumulation in internal organs were compared. The excretion rate of the insecticide in the urine and feces was not affected by continued administration and there were no differences between groups. ^{14}C-pyridafenthion was rapidly excreted into the urine as water soluble metabolites. The metabolites of pyridafenthion found in the urine of the first group of mice were desethyl pyridafenthion, desethyl pyridafenthionoxon, and phenyl maleic hydrazide and its glucuronide. Their composition varied slightly from the first day to the 21st day of continuous administration.

74-1639. Whitehead, C. C. (Agr. Res. Council's Poultry Res. Cent., Edinburgh, Scotland). **Growth depression of broilers fed on low levels of 2,4-dichlorophenoxyacetic acid.** *Brit. Poult. Sci. 14: 425-427; 1973.* (2 references)

Male and female Ross I broiler chicks were maintained for 8 weeks on diets containing 0, 2, 5, 10, 50, or 100 mg/kg 2,4-D. After 8 weeks the chicks fed the diets containing 10, 50, or 100 mg/kg pesticide were significantly lighter in weight than the control chicks; the birds fed the 5 mg/kg diet were also lighter, although not significantly so. A much less noticeable reduction in weight was observed after 4 weeks. The poorer growth rates were accompanied by reduced food intake, indicating that the chemical treatment reduced the palatability of the food. The food conversion efficiencies of the birds were not significantly affected by the pesticide treatment.

74-1640. Ivie, G. W.; Dorough, H. W.; Bryant, H. E. (Univ. Kentucky, Lexington, KY). **Fate of mirex-^{14}C in Japanese quail.** *Bull. Environ. Contam. Toxicol. 11(2): 129-135; 1974.* (4 references)

Fifteen Japanese quail of both sexes were treated

orally with mirex-^{14}C (1.1 to 1.2 mg/kg) at 10 weeks of age. The birds showed no perceptible signs of toxicity, and egg production was unaffected. About 12% of the original dose was eliminated in the feces of the females, with about 24% being eliminated in the feces of the males; 90% of the radioactivity in the feces was recovered within the first 24 hours. Approximately 50% of the dose appeared in the yolks of the eggs laid by the females during the first week after treatment; after 84 days, 85% of the dose had been eliminated by this route. Only traces of radiocarbon residues were detected in the egg white; none were found in the shell. The maximum radioactive residue concentration in the yolk was 5.8 ppm on the fourth day after treatment. Both male and female quail retained radiocarbon in the body throughout the 84-day study with the males retaining greater amounts than the females. The males retained higher radiocarbon residue concentrations in the body fat and muscle than the females, while the females had higher concentrations in the liver. Only unmetabolized mirex was recovered.

74-1641. Haseltine, S.; Uebelhart, K.; Peterle, T.; Lustick, S. (Dept. Zool. Ohio St. Univ., Columbus, OH). **DDE, PTH and eggshell thinning in mallard, pheasant and ring dove.** *Bull. Environ. Contam. Toxicol. 11(2): 139-145; 1974.* (23 references)

Hen mallards, pheasants, and ring doves were maintained on diets containing 10 ppm (mallards and pheasants) or 40 ppm (doves) *p,p'*-DDE. Some birds were subsequently injected with parathyroid hormone (PTH). The shells on the eggs laid by the DDE treated mallards decreased 20.41% in thickness over controls, and serum calcium of the hens was depressed. No eggs were laid after the PTH injection which raised the serum calcium levels. DDE also decreased shell thickness of eggs laid by ring doves and depressed the serum calcium values. PTH increased. DDE did not decrease the shell thickness of the eggs laid by the pheasants, while PTH increased it. Neither DDE nor PTH had clear-cut effects on the serum calcium values of the pheasants.

74-1642. Settlemire, C. T.; Huston, A. S.; Jacobs, L. S.; Havey, J. C.; Howland, J. L. (Dept. Biol., Bowdoin Coll., Brunswick, ME). **Action of some insecticides on membranes of mouse liver mitochondria.** *Bull. Environ. Contam. Toxicol. 11(2): 169-173; 1974.* (12 references)

The effects of allethrin, aldrin, and heptachlor on the membranes of mouse liver mitochondria were studied. Heptachlor stimulated respiration in the absence of ADP, but not in its presence. It did not significantly alter the efficiency of ATP synthesis as reflected in the ATP/O ratio. All three pesticides altered the light scattering responses to mitochondria suspended in isotonic sucrose; these alterations were dependent on the amount of pesticide present. Thus, these insecticides, when present in low concentrations, produce dramatic changes in the membranes of mammalian mitochondria. It is likely that these changes formed the basis for the observed increase in respiration in that they increased the permeability of the membrane to succinate or produced conformational changes of such a nature as to increase the intrinsic activity of the respiratory chain.

74-1643. Newsome, W. H. (Food Res. Labs., Health Protection Br., Dept. Nat. Health Welfare, Ottawa, Canada). **The excretion of ethylenethiourea by rat and guinea pig.** *Bull. Environ. Contam. Toxicol. 11(2): 174-176; 1974.* (10 references)

Ethylenethiourea (ETU, 20 mg/kg) in aqueous solution was administered via gastric intubation to fasted male Wistar rats and male Hartley strain guinea pigs. The animals were given food and water ad lib. for 5 hours after dosing. Approximately 50% of the administered ETU was excreted unchanged in the urine within 24 hours. The excretion of ETU in the feces was comparatively negligible. Mean residue levels in the liver, kidney, heart, and muscle 96 hours after dosing ranged from 0.010 ppm to 0.086 ppm in both species. Residue concentration in the thyroid was elevated in both species. The tissues may also have contained undetected metabolic residues.

74-1644. Murakami, M.; Fukami, J. I. (Rikagaku Kenkyusho, Wako-shi, Saitama, Japan). **Effect of chlorphenamidine and its metabolites on HeLa cells.** *Bull. Environ. Contam. Toxicol. 11(2): 184-188; 1974.*

The effect of chlorphenamidine and its metabolites was studied on cell growth and on the synthesis of DNA, RNA, and protein in HeLa cell cultures. The insecticide did not appear to affect the rates of DNA, RNA, and protein synthesis. However, the synthesis of macromolecules was inhibited by 40 to 50% at a concentration of 10^{-3} *M*. At lower dose levels the synthesis of macromolecules was virtually unaffected. The toxicity of chlorphenamidine was comparable to that of its two sequential metabolites, demethylchlorphenamidine and *N*-formyl-4-chloro-*o*-toluidine. The proposed final metabolite, 4-chloro-2-methylaniline, was the least toxic compound, while a chlorphenamidine analog, 5-chloro-2-nitrotoluene was the most toxic. The toxicity results correlated closely with the RNA inhibitory effects of these compounds.

74-1645. Balba, M. H.; Saha, J. G. (Canada Agr. Res. Station, Univ. Campus, Saskatoon, Saskatchewan, Canada). **Degradation of matacil by the ascorbic acid oxidation system.** *Bull. Environ. Contam. Toxicol. 11(2): 193-200; 1974.* (15 references)

The degradation of the carbamate insecticide, matacil (aminocarb), by the ascorbic acid oxidation system was investigated. There were at least 12 products formed during the oxidation of the pesticide by this

system. Ten of these products contained one or both of the N-$^{14}CH_3$ groups. Five of the products were tentatively or positively identified as: 4-amino-3-tolyl-*N*-methylcarbamate; 4-monomethylamino matacil; unreacted matacil; matacil phenol; and a mixture of hydroxy matacil and 4-dimethylamino-3-tolyl-*N*-hydroxymethylcarbamate. Thus the ascorbic acid oxidation system is capable of effecting demethylation, hydroxylation or aromatic ring, oxidation of -$NHCH_3$ group to -$NHCH_2OH$, and cleavage of the carbamate to the corresponding phenol.

74-1646. Kovtun, S. D.; Kokshareva, N. V. (Lab. General Toxicology, All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Vliyaniye novogo reaktivatora kholinesterazy LA-54 na spontannuyu aktivnost' nervno-myshechego sinapsa pri ostroy intoksikatsii DDVF. [The effect of the new cholinesterase reactivator LA-54 on the spontaneous activity of a neuromuscular synapse in acute DDVP intoxication.]** *Byull. Eksp. Biol. Med. 77(1): 25-27; 1974.* (10 references) (Russian)

The effect of a new cholinesterase reactivator LA-54 (*p*-bromobenzothiohydroximic acid *S*-diethylaminoethyl ester hydrochloride) was studied on the amplitude and frequency of the miniature end-plate potentials of the albino rat tail after acute poisoning by DDVP (dichlorvos). The cholinesterase reactivator alone, administered i.m., in a 40 mg/kg dose did not cause any noteworthy change in either the amplitude or the frequency of the end-plate potential. Orally administered DDVP (LD50) increased the frequency by 50% from 1±0.08 c/s to 1.5±0.12 c/s and the amplitude by 150% from 0.21±0.08 mV to 0.58±0.025 mV. Following joint application of LA-54 and DDVP, no change in the frequency of the end-plate potential occurred during the 90 min-test. However, the amplitude of the end-plate potential increased 39% temporarily. The cholinesterase reactivator is not supposed to have a direct influence on the neuromuscular synapses.

74-1647. Charlton, K. M. (Anim. Pathol. Div., Health Anim. Branch, Agr. Canada, Anim. Dis. Res. Inst., P.O. Box 1400, Hull, Quebec, Canada). **Experimental alkylmercurial poisoning in swine. Lesions in the peripheral and central nervous systems.** *Can. J. Comp. Med. 38(1): 75-81; 1974.* (25 references)

Feeding pigs with daily doses of a fungicide containing 1.97% methylmercury 2,3-dihydroxy propyl mercaptide and 0.42% methylmercury acetate in doses ranging from 0.24 to 5.76 mg Hg/kg caused a gradual decrease in feed consumption, reduced growth, dullness of most of the pigs, and eventually disturbances of gait, blindness, recumbency, and death. Wallerian degeneration in sensory fibers and neuronal degeneration in dorsal root ganglia were observed in microscopic studies on the peripheral nerves. Neuronal degeneration of ischemic type, glial degeneration, gliosis, and necrosis of the media of meningeal arterioles were present in the central nervous system. Since the lesions developed sequentially and segmental demyelination was absent, the primary lesion in the peripheral nervous system was probably neuronal-axonal degeneration.

74-1648. Weis, P. (Dept. Anat., New Jersey Med. School, Newark, NJ 07103). **Ultrastructural changes induced by low concentrations of DDT in the livers of the zebrafish and the guppy.** *Chem.-Biol. Interactions 8(1): 25-30; 1974.* (9 references)

Zebrafish were sensitive to a concentration of 3 ppb DDT in the water, and most died at this concentration within 24 hr. At 0.3 ppb zebrafish survived for up to 16 days. A rapid glycogenolysis was observed in hepatocytes with an accompanying loss in lipid droplets and decrease in size of the cells. Proliferation of smooth endoplasmic reticulum (SER) was not observed in these fish but did occur in guppies, which were much less sensitive to the insecticide. Over a 28-day period guppies exhibited neither loss of glycogen or lipid nor a change in the size of hepatocytes. Almost all of the DDT available in the water was taken up by the fish. It is possible that lower lipid levels in zebrafish allowed DDT to produce toxic symptoms before proliferation of SER was able to take place to handle degradation of the insecticide.

74-1649. Greig, J. B.; Taylor, D. M,; Jones, J. D. (MRC Toxicol. Unit, Med. Res. Council Lab., Woodmansterne Rd., Carshalton, Surrey, England). **Effects of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin on stimulated DNA synthesis in the liver and kidney of the rat.** *Chem.-Biol. Interactions 8(1): 31-39; 1974.* (32 references)

No significant differences were observed in DNA synthesis in partially hepatectomized rats pretreated with 10 or 200 μg/kg 2,3,7,8-tetrachlorodibenzo-*p*-dioxin or not pretreated. DNA synthesis stimulated in the tubular epithelium of the kidney by folic acid was lower in animals given 10μg/kg dioxin, but this effect appeared to be related directly to the reduction in food intake in animals pretreated more than 24 hr before administration of folate. A depression of kidney mitosis was also observed after dioxin treatment when lead was used as stimulating agent. The depression is apparently not related directly to interaction of dioxin with DNA, inhibition of the protein synthesis required for DNA synthesis, alteration of the time course of the mitotic cycle of the kidney, or depression of food intake by dioxin.

74-16[illegible] ...aque, A.; Weisgerber, I.; Klein, ... nst. fuer Oekol. Chemie, Gesellschaft fuer Strahlen- und Umweltforschung mbH, Munich, Germany). **Beitraege zur oekologischen Chemie LXVIII. Metabolismus von**

Buturon-14C in Weizenblaettern. [Contributions to ecological chemistry, Part 68. Metabolism of buturon-^{14}C in wheat leaves.] *Chemosphere 3(1): 9-12; 1974.* (12 references) (German)

The metabolism of ^{14}C-labeled buturon was studied in cut-off wheat leaves. Ten-day-old wheat leaves were cut off and kept in a nutrient solution for 3 hr to study buturon metabolism. The percentages of soluble metabolites and of non-extractable radioactivity increased. The radioactivity transferred into the nutrient solution during the experiment was both negligible and relatively constant during the duration of the experiment; it was composed mostly of buturon (87%) and of a few metabolites. The hydrophilic metabolite group included at least four components that could be separated with acetic acid on thin-layer chromatograph. Neither *p*-Cl-aniline nor other metabolites less polar than buturon were detected.

74-1651. Bertrand, D.; Wolf, A. de, (Author address not given). **Influence de certains desherbants sur la microflore du sol. Consequences agronomiques. [Influence of certain weed eradicators on the soil microflora. Agronomic consequences.]** *C. R. Seances Acad. Agr. Fr. 58(17): 1469-1473; 1972.* (5 references) (French)

The effect of Printazol, composed of 2,4-D and 2,4-MCPA, on the soil microflora was studied in wheat fields treated with 0.25, 0.5, 1 or 2 liter of Printazol per hectare, which corresponds to 330 g of 2,4-D and 285 g of 2,4-MCPA per liter. Immediately after its application in April, Printazol had toxic effects on pectinolytic bacteria and on the ammonification activity in the soil, but its effect changed to beneficial by June, especially for doses around 1 liter/ha, while 2 liter/ha doses remained toxic. Printazol had little influence on *Azotobacter*, but it had beneficial effect on *Clostridium* in doses of 0.5 liter/ha. The optimum dose of Printazol was found to be about 1.3 liter/ha.

74-1652. Koudela, K.; Sova, Z.; Pujman, V.; Janda, J.; Trefny, D.; Houska, J.; Vrbenska, A.; Hrdinova, A.; Nemec, Z. (Dept. of the Physiology of Farm Animals, Agricultural University, Prague, Czechoslovakia). **Aktivita nekterych plasmatichkych a jaternich enzymu u bazantu po nizkych davkach endrinu a v rekonvalescenci. [Activity of some plasma and liver enzymes in pheasants following administration of low doses of endrin and during recovery.]** *Cesk. Fysiol. 21(4): 376; 1972.* (Czech)

In pheasants administered endrin glutamic-oxalacetic transaminase activity in the livers and in the serum did not change significantly, but glutamic-pyruvic transaminase activity in the livers markedly decreased. Increased alkaline phosphatase activity was found in the livers of the pheasants which had received the higher dose of endrin. Changes were also observed in the specific activity of liver enzymes: GOT and GPT activities decreased, the alkaline-phosphatase activity decreased as well as increased in both groups of pheasants although these variations were at the limits of statistical significance.

74-1653. Koudela, K.; Sova, Z.; Pujman, V.; Janda, J.; Vrbenska, A.; Houska, J.; Mostkova, I.; Trefny, D.; Hrdinova, A.; Nemec Z. (Dept. of the Physiology of Farm Animals, Agricultural University, Prague, Czechoslovakia). **Proteinemie, elektroforeogramy a urikemie u bazantu po nizkych davkach endrinu a v rekonvalescenci. [Proteinemia, electrophoregrams and uricemia following low doses of endrin and during convalescence.]** *Cesk. Fysiol. 21(4): 376-377; 1972.* (Czech)

Endrin was orally administered to pheasants at 0.02 mg and 0.009 mg/kg body weight/day. Differences in the proteinemia and uricemia data after endrin administration was not significant. However, beta-globulins significantly decreased in the pheasants fed the larger dose. The uric acid level in the liver fell significantly during the experimental period.

74-1654. Pujman, V. (Research Institute for Pharmacology and Biochemistry, Prague, Czechoslovakia). **Zmeny krevniho obrazu bazantu po podani nekterych pesticid. [Blood picture changes in pheasants following administration of some pesticides.]** *Cesk. Fysiol. 21(4): 380; 1972.* (Czech)

The changes in the blood picture and in the bone marrow in pheasants after administration of DDT, endrin, and phosalone for 14 days were studied. After the final administration of DDT, lymphopoiesis and a slight shift to the left in the white series were observed; 48 hours later, a modest activation of the red-blood corpuscle formation appeared. Twenty-four hours after the final administration of endrin, the number of red blood corpuscles was slightly decreased, but their size was slightly increased; activation of the formation of red blood corpuscles in the bone marrow was observed. After 14 days, the hemoglobin content was slightly decreased and the hematocrit slightly increased. These changes produced a statistically significant drop in the color concentration. The number of white blood corpuscles indicated lymphopoiesis; the marrow showed increased orthochromic normoblasts. Similar though less marked changes followed the administration of phosalone. Changes in the hemograms and in the medulograms were not accompanied by any changes in the weight, appearance, or the behavior of the animals, and there were no fatalities. The DDT and endrin concentrations in the livers of the experimental animals were higher than in those of the control group.

74-1655. Sova, Z.; Houska, J.; Trefny, D.; Koudela, K.; Pujman, V.; Janda, J.; Nemec, Z. (Dept. of the Physiology of Farm Animals, Agricultural University, Prague,

Czechoslovakia). **Zmeny v aktivite serovych a jaternich enzymu po nizkych davkach DDT u bazantu. [Changes in the activity of serum and liver enzymes following administration of low DDT doses in pheasants.]** *Cesk. Fysiol. 21(4): 381; 1972.* (2 references) (Czech)

Hen pheasants were fed corn containing 0.04% Dykol (i.e. 0.02% DDT) for 14 days. Samples of venous blood (from the wings) and of liver tissue were taken before and after the experiment and again 14 days later. The serum activities of glutamic-oxalacetic transaminase, glutamic-pyruvic transaminase, and alkaline phosphatase did not show any significant changes. The livers showed, at the conclusion of the experiment, insignificant increases in the aspartate transferase, alanine aminotransferase, alkaline phosphatase, and α-amylase activities. At the end of the recovery period, the activities of the liver enzymes were almost identical with those in the control group.

74-1656. Sova, Z.; Trefny, D.; Koudela, K.; Houska, J.; Pujman, V.; Janda, J.; Vrbenska, A.; Mostkova, I.; Nemec, Z. (Dept. of the Physiology of Farm Animals, Agricultural University, Prague, Czechoslovakia). **Hodnoty proteinemie, urikemie, elektroforeogramy, mnozstvi glykogenu lipidu, npn a kyseliny mocove v jatrech po nizkych davkach DDT u bazantu. [Proteinemia, uricemia, electrophoregrams, glycogen and lipid contents, non-protein nitrogen and uric acid contents in pheasant livers after small doses of DDT.]** *Cesk. Fysiol. 21(4): 382; 1972.* (2 references) (Czech)

Pheasants were given a diet of corn containing 0.04% Dykol (i.e., 0.02% DDT) for 14 days. Increased uricemia, decreased non-protein nitrogen, and decreased uric acid were found in the livers 24-28 hr after the conclusion of the experiment. The total liver lipids were also lower. The loss of lipids was significant and became even more apparent during the next 14 days when no further DDT was ingested. However, paper electrophoresis did not show any marked differences in the overall proteinemia and in the albumin fractions.

74-1657. Anonymous. **Un nouvel herbicide a base de thiadiazoles. [New thiadiazole-base herbicide.]** *Chim. Actual. 1523: 42-43; 1974.* (French)

Toxicological and efficiency tests are described concerning a new thiadiazole-base herbicide (3-(5-ethylsulfonyl-1,3,4-thiadiazole-2yl)-1,3-dimethylurea), developed by Bayer and being homologated. The LD50 value, determined by oral administration, to rats is 5,000 mg/kg of body weight in males and 1,000 mg/kg in females. No symptoms of poisoning were detected in rats exposed to 242 and 290 mg/m^3 concentrations of the herbicide for 4, 16, and 20 hours. The LD50 determined s.c. to male rats was 1,000 mg/kg. The herbicide did not cause skin and eye irritations in rabbits.

74-1658. Bourquin, A. W.; Alexander, S. K.; Speidel, H. K.; Mann, J. E.; Fair, J. F. (Dept. Biol., Univ. Houston, Houston, TX 77004). **Microbial interactions with cyclodiene pesticides.** *Develop. Ind. Microbiol. 13: 264-276; 1972.* (10 references)

Technical heptachlor added to mixed cultures isolated from Texaco Company cutting fluids by pesticide enrichment methods supported a significant increase in cell mass in the presence of acetone or acetone and yeast extract. The ether extracts of mixed culture and individual isolates incubated with labeled heptachlor contained much less activity than those of control flasks. The majority of the activity was found in the cellular fractions. Activity in the aqueous phase was primarily associated with glutamic and aspartic acids and also with malic, citric, and *p*-aminobenzoic acids. Rapid formation of 1-hydroxychlordene occurred in uninoculated flasks, suggesting that metabolism observed could have been that of 1-hydroxychlordene rather than heptachlor. Three metabolites in the ether fraction were identified: chlordene, in supernatants from isolates 2 and 4; 1-hydroxy-2,3-epoxychlordene in all isolates, and heptachlor epoxide along with the other metabolites, in mixed cultures. Order of uptake of the pesticides in technical heptachlor was nonachlor > γ-chlordane > heptachlor.

74-1659. Dorough, H. W.; Cardona, R. A.; Lolmaugh, S. C. (Dept. Entomol., Univ. Kentucky, Lexington, KY). **Metabolism of the herbicide methazole (2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione) in rats.** *Drug Metab. Disposition 2(2): 129-139; 1974.* (5 references)

The metabolism of ^{14}C-labeled methazole was investigated in female Sprague-Dawley rats. The nature and level of residues in the urine, feces, and tissues were determined. Within 48 hours of pesticide administration, 58% of the compound was eliminated in the urine and feces. The major urinary metabolite was *N*-(2-hydroxy-4,5-dichlorophenyl)urea which accounted for 46% of the total radiocarbon in the urine. Another ring-hydroxylated compound, *N*-(2-hydroxy-3,4-dichlorophenyl)urea, accounted for 14% of the urinary radiocarbon. Both compounds were present almost entirely as glucuronides. 3,4-Dichlorophenylurea was the major metabolite in the feces; it existed almost entirely in the free form. Ninety-six hours after treatment, the highest methazole-^{14}C equivalents were in the kidneys, liver, and fat (0.8, 0.1, and 0.07% of the original dose per gram, respectively). In rats dosed orally with 100 mg/kg methazole daily for 17 days or given a single oral dose of 3-(3,4-dichlorophenyl)-1-methylurea, the same metabolites were formed as in rats treated with a single oral dose of methazole.

74-1660. Kay, K. (Environmental Sci. Lab., Mt. Sinai Sch. Med., City Univ. New York, New York, NY).

Toxicology of pesticides: recent advances. *Environ. Res. 6(2): 202-243; 1973.* (324 references)

Recent developments regarding pesticide toxicology are discussed in terms of production and control legislation, general toxicity, mercury containing pesticides, the bipyridyl herbicides, the toxicology of captan, the carcinogenic aspects of pesticides, vehicles and carriers, and the distribution of pesticides in the environment. A section on organic phosphates and carbamates includes the perinatal effects of these compounds and their effects on endocrine activity. Chlorinated hydrocarbon pesticides are discussed with regard to hexachlorophene, polychlorinated biphenyls, their storage in fat, their relation to mixed-function oxidizing enzyme induction, the interaction of pesticides in the organism, perinatal toxicity, and the endocrinological aspects of chlorinated hydrocarbon pesticides.

74-1661. Weis, P.; Weis, J. S. (Dept. Anat., Coll. Med., Newark, NJ). **DDT causes changes in activity and schooling behavior in goldfish.** *Environ. Res. 7(1): 68-74; 1974.* (25 references)

Goldfish were maintained in groups of five fish in glass tanks containing spring water with or without 1 ppb *p,p'*-DDT. After three days the treated fish showed increases in individual activity, school size, and angular deviation. In response to a fright stimulus, the treated schools scattered more and did not regroup as quickly as the nontreated schools. These differences disappeared within one week after the treated fish were transferred to untreated water. The observed impairment in schooling behavior and regrouping after fright would make the DDT-treated fish more susceptible to predation, thus placing them at an ecological disadvantage. Predators feeding on the more easily caught DDT-treated fish would accumulate higher concentrations of DDT in their own tissues. Thus, the negative effects of small amounts of DDT could be passed on and amplified at higher trophic levels. The deleterious effects of DDT on activity and schooling should be considered reversible after short exposures.

74-1662. Kar, P. P.; Matin, M. A. (Ind. Toxicol. Res. Cent., Chater Manzil Palace, Lucknow, India). **Possible role of cerebral aminoacids in acute neurotoxic effects of DDT in mice.** *Eur. J. Pharmacol. 25(1): 36-39; 1974.* (23 references)

Administration of *p,p'*-DDT, but not *o,p'*-DDT, to male mice produced symptoms such as hyperexcitability to tactile stimuli and tremors after 2-3 hr and convulsions after 4-5 hr. At 5 hr after administration of *p,p'*-DDT the concentration of GABA, taurine and glycine in cerebral hemispheres was reduced, while that of aspartic acid, α-alanine, glutamic acid and glutamine remained unchanged. No effect on brain amino acids was observed with *o,p'*-DDT. The results indicate that some of the amino acids in the cerebral hemispheres may be involved in the neurotoxic effects produced by *p,p'*-DDT.

74-1663. Jovic, R. C. (Dept. Pharmacol. Toxicol., Inst. Tech. Med. Protect., Belgrade, Yugoslavia). **Correlation between signs of toxicity and some biochemical changes in rats poisoned by soman.** *Eur. J. Pharmacol. 25(2): 159-164; 1974.* (15 references)

Adult male rats were injected s.c. with sublethal (88 g/kg) or lethal (141 g/kg) doses of soman, after which the animals were observed for toxic symptoms, biochemical changes, and behavioral changes. During the acute phase of soman poisoning, a close relationship was seen between the severity of the toxic symptoms, cholinesterase activity, and the increase in the concentration of plasma glucose. From 2 to 24 hours postinjection, the correlation between the severity of the toxic signs and the biochemical changes gradually disappeared. During this period, the depression of spontaneous motor activity, toxic symptoms and hyperglycemia disappeared, while the cholinesterase activity in the blood, brain, and diaphragm remained unchanged. Thus, the relatively rapid spontaneous recovery of animals from the toxic effects of soman is not caused by enzyme regeneration. Some adaptation may occur at the synapses under these abnormal conditions and is responsible for the rapid spontaneous recovery of animals poisoned by soman.

74-1664. Sova, R. Ye.; Tsapko, V. G.; Gokhman, V. L. (Inst. Occup. Hyg. and Occup. Dis., Kiev, USSR). **Analiz sily vliyaniya faktorov sredy pri mnogokratnom kombinirovannom vozdeystvii. [Assay of the degree of effect of environmental factors with multiple combined activity.]** *Gig. Tr. Prof. Zabol. 18(2): 46-48; 1974.* (Russian)

The technique of dispersion analysis of the effects of environmental factors with multiple combined action is illustrated, using the example of individual and combined effects of trichlorfon and noise on albino rats. The test animals were fed 1/20 LD50 of trichlorfon daily and exposed to noise at 106 dB for 2 hr daily for 60 days. A 16.7% increase in the cholinesterase activity in the cerebral cortex and a 43% decrease in the cholinesterase activity were measured in animals exposed to noise and trichlorfon, respectively, for 20 days, while the reduction of cholinesterase activity in animals exposed to both trichlorfon and noise was only 32.4%. The effect of noise became significant by the 40th day of the experiment. Later on, the effect of one factor became dependent on the degree (absence or presence) of the other factor. Dispersion analysis is suitable for predicting the interaction and effects of several factors.

74-1665. Pravda, O. (Dept. Pedagogy, Ceske Budejovice, Czechoslovakia). **Ueber den Einfluss der Herbizide auf**

einige Suesswassertiere. [The effect of herbicides on fresh-water animals.] *Hydrobiologia 42(1): 97-142; 1973.* (80 references) (German)

The effects of herbicides, selected from different chemical classes, at concentrations of 1000, 100, and 10 mg/l were examined on a variety of freshwater organisms. At the maximum herbicide concentration, toxicity decreased in the following order: Liro-CIPC (chlorpropham), Alipur (cycloron plus chlorbufam), dinoseb, Dikotex-30 (30% MCPA), Spritz-Hormit (80% sodium 2,4-D), Rafex (90% ammonium salt of DNOC), MCPA, Agrion (also 80% sodium 2,4-D), Ugex (TCA plus 2,4-D), DP-fest (dichlorprop), Kampinex L (97% sodium chlorate), TCP (trichloropropionic acid), Travex (95% sodium chlorate), and NaTA (sodium TCA). The order of toxicity changed somewhat at the lower concentrations. *Esox lucius* and *Perca fluviatilis* were the most sensitive species overall, followed by *Phoxinus phoxinus, Daphnia pulex*, and *Micronecta minutissima*. *Leucaspius delineatus, Asellus aquaticus, Gammarus pulex*, and *Cyprinus carpio* were moderately sensitive, whereas *Tubifex* sp., *Planaria gonocephala, Rana temporaria*, and *Lymnaea stagnalis* were only slightly sensitive to the herbicides at the tested concentrations. Eight different dynamic patterns of toxic action of the different herbicides in the different species were established. Carbamates and phenol derivatives were most toxic, followed by derivatives of phenoxyacetic acid, while inorganic herbicides and organochlorine herbicides were only slightly toxic.

74-1666. Namdeo, K. N.; Dube, J. N. (Jawaharlal Nehru Agr. Univ., Jabalpur, India). **Herbicidal influence on growth sensitivity and mutagenic transformation in rhizobia.** *Indian J. Exp. Biol. 11(2): 114-116; 1973.* (8 references)

Rhizobial colonies were isolated from grassland soils untreated or treated with dalapon or paraquat. These colonies were then incubated for 5 days at 30°C in YEM broth containing 0, 100, 500, 1000, or 2000 ppm dalapon or paraquat. Dalapon (500 ppm) and paraquat (1000 ppm) inhibited the growth of the colonies. Dalapon reduced the stationary phase of the fast growers only, while paraquat doubled the lag phase and lengthened the log phase of growth. The rhizobia tolerated the herbicides in concentrations up to 100 ppm but were unable to degrade them. Both compounds acted as mutagenic agents and yielded mutants, with great variations in colonial morphology and the pantothenate requiring *pan*$^+$ auxotrophs. Paraquat produced revertants, colonial mutants, and congo red absorption *cra*$^+$ mutants. The data indicates that paraquat and dalapon should not be harmful to grassland rhizobia in the concentrations applied to control weeds.

74-1667. Namdeo, K. N.; Dube, J. N. (Jawaharlal Nehru Agr. Univ., Jabalpur, India). **Proteinase enzyme as influenced by urea and herbicides applied to grassland oxisol.** *Indian J. Exp. Biol. 11(2): 117-119; 1973.* (11 references)

The long term effects of urea-N, dalapon, and paraquat on various enzyme systems and on the nitrogen trapped in the soil macromolecules were determined following the application of these compounds to a grassland sward. Both urea and the herbicides tended to increase the urease activity in the soil while decreasing the proteinase activity. Urea and dalapon both decreased the activity of proteinase with the decrease being enhanced in the presence of both compounds. The proteinase activity was increased by urea in combination with paraquat. The antagonism between urea and paraquat was also shown in the reduction in ureolytic actinomycete numbers caused by this combination.

74-1668. Neilson, J. T. McL.; Forrester, D. J.; Thompson, N. P. (Dept. Vet. Sci., Univ. Florida, Gainesville, FL 32601). **Immunologic studies on Heligmosomoides polygyrus infection in the mouse: the dynamics of single and multiple infections and the effect of DDT upon acquired resistance.** *Int. J. Parasitol. 3: 371-378; 1973.* (20 references)

Swiss Webster mice of both sexes were infected with 100, 200, 300 or 400 third stage larvae of *Heligmosomoides polygyrus bakeri* at intervals of four weeks. Where appropriate, the preceding infection was terminated with anthelmintic 7 days prior to the subsequent infection. The mice were killed at regular intervals following each infection and the worm burdens compared with those found in control mice given a primary infection of the same size. The expulsion of worms in the mice given three previous infections occurred after day 3 and after day 7 postinfection, indicating that the larvae moulting from the fourth to fifth stages may be most susceptible to the host's resistance mechanisms. The administration of *p,p'*-DDT to hyperinfected mice did not interfere with the immunologic expulsion of the worms; the DDT residue levels in the treated mice were much higher than have been recorded among several species of wild rodents.

74-1669. Ruban, Ye. L. (Inst. of Microbiol., Acad. of Sciences of the USSR, Moscow, USSR). **Razlozheniye neprirodnykh soyedineniy mikroorganizmami. [Decomposition of nonnatural compounds by microorganisms.]** *Izv. Akad. Nauk SSSR Ser. Biol. 11(3): 301-312; 1973.* (63 references) (Russian)

Studies on the effects of industrial wastes and pesticides on soil and other microorganisms, and the degradation of pesticides by microorganisms are reviewed. Herbicides of the phenoxyacetate group have practically no effect on soil bacteria and may even stimulate the growth of Arthrobacter. Sporiferous bacteria are relatively resistant to herbicides, while nitrifying microorganisms are highly susceptible to

atrazine and fenuron, and denitrifying bacteria are temporarily inhibited by herbicides. Phenol derivatives and fenuron inhibited growth of cellulolytic bacteria. Actinomycetes and fungi are relatively resistant to most of the herbicides. Degradation of simazine and atrazine by *Bacillus mesentericus, B. mycoides, C. cereus, B. agglomeratus, B. idosus,* and *Pseudomonas fluorescens*; degradation of paraquat by certain *Lipomyces* spp.; decomposition of dimethylamine by *P. aminovorans, Aerobacter aerogenes,* and *Bacterium herbicola*; degradation of ethylene diamine by *Aerobacter aerogenes* and *B. polymyxa*; degradation of malathion by carboxyesterases of *Trichoderma viridae* and *Pseudomonas* spp.; breakdown of DDT by *Actinomyces* spp., *Aerobacter aerogenes,* and *Mucor alternans*, and decomposition of carbaryl by *Gliocladium roseum* were observed.

74-1670. Gruzdev, G. S.; Kuz'mina, I. V. (Dept. Chemical Means of Plant Protection, Timiryazev Akad. Agr. Sci., USSR). **Vliyaniye treflana na biologicheskuyu aktivnost' pochvy v posevakh podsolnechnikakh. [Effect of treflan on the biological activity of the soil in sunflower plantings.]** *Izv. Timiryazev Sel'skokhoz. Akad. 4: 136-141; 1973.* (23 references) (Russian)

The effect of treflan on the soil microorganisms in sunflower plantings and on enzymatic activities in composting tests was studied. Treflan, applied at a depth of 10 cm in normal doses of 1-3 kg/ha and in increased dose of 15 kg/ha, failed to cause essential changes in the composition and numbers of soil microorganisms, as well as on the activity of urease, phosphatase, invertase, and catalase. Treflan doses of 3 and 15 kg/ha caused temporary increase in the fungal population by 22-28.8% two weeks after application, similar depression of sporiferous bacteria, and slight depression of aerobic bacteria when used in 15 kg/ha doses. Treflan sometimes even stimulated the actinomycetes, but it had no effect on ammonifying, denitrifying, and nitrifying bacteria.

74-1671. Dubey, H. D.; Rodriguez, R. L. (Dept. Agronomy Soils, Agr. Exp. Station, Mayaguez Campus, Univ. Puerto Rico, Rio Piedras, Puerto Rico). **Changes in soil microflora following application of fungicides dyrene and maneb to tropical soils.** *J. Agr. Univ. P. R. 57(1): 78-86; 1974.* (6 references)

Dyrene and maneb were applied in concentrations of 0, 60, 240, or 960 ppm to samples of the acid lateritic Humatas clay and the alkaline fertile San Anton loam of Puerto Rico. The samples were incubated in the laboratory at approximately 23°C for 18 months during which time changes in the soil microorganisms were monitored. In general, the bacterial populations increased, while the fungus and actinomycete populations decreased; these effects tended to increase with increasing chemical concentrations. The bacteria, which seemed to be the principal microorganisms responsible for the degradation of the two fungicides in the soil, showed no increase after 10 months except in the soils treated with 960 ppm maneb. Maneb caused qualitative as well as quantitative changes in the fungal populations. The microorganisms in the two soil types differed in their responses to the pesticides. In all instances, inhibition of the microorganisms was reversed following the application of fresh soil.

74-1672. Williford, J. H., Jr.; Kelly, R. F.; Graham, P. P. (Virginia Polytechnic Inst. State Univ., Blacksburg, VA). **Residual bromide in tissues of rats fed methyl bromide fumigated diets.** *J. Anim. Sci. 38(3): 572-576; 1974.* (12 references)

Male weanling rats were maintained for 56 days on diets fumigated with methyl bromide and containing 0, 290, 601, or 1177 ppm residual bromide. There were no differences in the feeding efficiency, growth, weight gain, or organ size between the four groups. However, the amount of bromide in the blood, lungs, spleen, kidneys, heart, and liver increased significantly and linearly as a function of the bromide content in the feed. The eyes contained the highest concentrations of residual bromides. In a second experiment male weanling rats maintained on a diet containing 1177 ppm residual bromide were sacrificed after 2, 4, 6, or 8 weeks on this diet. These groups did not differ in terms of growth rate, general health, or condition. The residual bromide levels in the tissues increased rapidly with time, with maximum levels in the blood, liver, and heart being reached within the first two weeks. Maximum levels in the spleen, kidneys, eyes, lungs, triceps, and gastrocnemius were reached within four weeks, and maximum concentrations in the testes were reached within six weeks. After reaching the maximum levels, the residual bromides decreased in concentration in the individual tissues as a result of elimination from the body or transferral by the blood to other sites.

74-1673. Kourounakis, P.; Szabo, S.; Villeneuve, C.; Gagnon, M. (Inst. de medecine et de chirurgie experimentales, Universite de Montreal, Montreal, Quebec, Canada). **Effect of pharmacologic or surgical conditioning upon intoxication with arsenicals.** *J. Eur. Toxicol. 6(4-5): 232-236; 1973.* (34 references)

The toxicity of arsenic trioxide or arsenic pentoxide in rats was reduced by pretreatment with spironolactone, and to a lesser degree by phenobarbital or diphenylhydantoin. Prednisolone, triamcinolone, and estradiol aggravated arsenic pentoxide intoxication, and thyroxine and triamcinolone increased arsenic trioxide susceptibility. Prednisolone and triamcinolone protected against neurolathyrism and mortality produced by *N*-carbamoylarsanilic acid, and the nephrocalcinosis induced by this drug was prevented by prednisolone. The catatoxic steroids had no protective effect and in some cases enhanced the toxicity of sodium arsanilate and *N*-carbamoylarsinic acid. Intoxication with arsenic

trioxide was not influenced by any tested surgery. Hepatectomy and nephrectomy increased the dyskinesias and mortality produced by arsenic pentoxide. The protection afforded by spironolactone does not appear to be based on microsomal enzyme induction since other known inducers failed to reduce toxicity of arsenic oxides. The thioacetyl group of spironolactone or its direct action on the kidney may play a significant role in prophylaxis.

74-1674. Bickers, D. R.; Kappas, A.; Alvares, A. P. (Rockefeller Univ., New York, NY). **Differences in inducibility of cutaneous and hepatic drug metabolizing enzymes and cytochrome P-450 by polychlorinated biphenyls and 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)-ethane (DDT).** *J. Pharmacol. Exp. Ther. 188(2): 300-309; 1974.* (45 references)

DDT and a mixture of PCBs were applied to the skin of male Sprague-Dawley rats and effects on the hepatic and cutaneous drug-metabolizing enzymes and cytochrome P-450 determined. Both chemicals produced significant changes in the activity of the hepatic mixed function oxidase system, with the PCBs being a more potent inducer than DDT. Cutaneous application and injection of the PCBs produced similar effects on the hepatic mixed function oxidase system, but DDT was more potent when injected than when applied cutaneously. The cutaneous application of DDT caused a 2-fold induction of hepatic cytochrome P-450, while the PCBs evoked a greater than 3-fold induction of cytochrome P-448. The cutaneous application of PCBs caused a greater than 10-fold induction in liver benzo(a)-pyrene hydroxylase activity and a greater than 7-fold induction in the skin enzyme activity: DDT had only a slight inductive activity in both tissues. A microsomal preparation of skin treated with PCBs contained a hemoprotein with an absorption peak at about 448 nm; untreated skin microsomes showed no such peak. The data indicates that the skin plays a signficant role in the detoxification process following exposure to selected environmental chemicals.

74-1675. Wells, M. R.; Yarbrough, J. D. (Middle Tennessee State Univ., Murfreesboro, TN). **DDT retention to cellular fractions of vertebrate insecticide-resistant and susceptible tissues.** *J. Tenn. Acad. Sci. 47(2): 62; 1972.*

DDT-resistant and susceptible mosquitofish (*Gambusia affinis*) were treated in vivo with DDT-C^{14}. The uptake of DDT by particulate fractions of their brains showed a significant difference between the susceptible and resistant fish. The data indicates that the resistant fish had a membrane barrier as well as a more effective blood-brain barrier to DDT uptake.

74-1676. Cress, C. R.; Strother, A. (Dept. of Physiol., Pharmacol. and Biophys., Sch. of Med., Loma Linda Univ., Loma Linda, CA 92354). **Effects on drug metabolism of carbaryl and 1-naphthol in the mouse.** *Life Sci. 14(5): 861-872; 1974.* (26 references)

The effects of carbaryl and 1-naphthol on hepatic microsomal drug-metabolizing enzyme systems were investigated. The agents were fed at a level of 25 mmol/kg of feed to groups of young male Swiss-Webster mice for 14-day periods. Body weight was depressed by carbaryl, but not by 1-naphthol. The rates of in vitro metabolism of aniline and benzphetamine were greater than control rates in livers of mice fed carbaryl, but the rate of in vivo hydrolysis of the carbamate Zectran (mexacarb) was decreased by carbaryl feeding. Administration of 1-naphthol did not change the rates of in vitro metabolism of either aniline or benzphetamine. Hepatic microsomal concentrations of cytochromes P-450 and b_5 were increased by carbaryl, but feeding of 1-naphthol did not affect levels of either cytochrome. Radiolabeled pentobarbital disappeared from the blood of carbaryl-fed mice more rapidly than from the blood of control animals, and carbaryl-fed mice slept a shorter period of time than controls following pentobarbital administration. The LD50 of an acute oral dose of carbaryl was increased two-fold by feeding carbaryl for 14 days. It was concluded that carbaryl is a weak inducer of hepatic microsomal drug-metabolizing activity, and that the effects observed are not likely due to 1-naphthol. (Author abstract by permission)

74-1677. Balasubramanian, A.; Rangaswami, G. (Univ. Agr. Sci., Bangalore, India). **Influence of foliar application of chemicals on the qualitative changes in bacterial and fungal populations in the rhizospheres of *Sorghum vulgare* and *Crotalaria juncea*.** *Madras Agr. J. 60(3): 218-224; 1973.* (17 references)

Pots containing healthy sorghum and sunnhemp plants were treated with the following sprays at 20, 25, 30, 45, and 75 days of age: sodium nitrate, disodium hydrogen phosphate, 2,4-D, dithane Z-78 (zineb), or distilled water. The bacterial and fungal populations of the pots were then analyzed in terms of Gram reaction, spore formation, nitrate reduction, ammonia production, acid production, starch hydrolysis, gelatin liquefaction, and cellulose decomposition. The sodium nitrate and disodium hydrogen phosphate treatments reduced the Gram-negative bacterial populations and encouraged the growth of the spore formers; the 2,4-D and Dithane Z-78 treatments produced opposite effects. The nitrate reducing bacteria were increased by sodium nitrate and 2,4-D and decreased by Dithane Z-78 and disodium hydrogen phosphate. None of the treatments increased the percentage of ammonia producers; Dithane Z-78 reduced their numbers. All of the treatments stimulated the starch hydrolyzers in the sorghum rhizospheres, but only disodium hydrogen phosphate increased their numbers in the sunnhemp rhizospheres. In the sunnhemp rhizospheres all treatments reduced the gelatin liquifiers, while all but the 2,4-D spray increased their

numbers in the sorghum rhizospheres. All but the disodium hydrogen phosphate spray enhanced the growth of the bacteria requiring amino acids. Sodium nitrate and 2,4-D stimulated *Aspergillus* and suppressed *Penicillium*. In addition, *Helminthosporium* and *Fusarium*, which are normally not present in the rhizospheres of sorghum plants, were found in the rhizospheres of sorghum plants treated with disodium hydrogen phosphate or 2,4-D.

74-1678. Lund-Hoeie, K. (Norwegian Plant Protection Inst., Dept. Weed Control, Saertrykk nr. 107, Norway). **Distribution and degradation of MCPA in woody species and the influence of ioxynil or bromoxynil on these processes.** *Meld. Norg. Landbrukshoegsk. 52(19): 1-15; 1973.* (11 references)

In birch and alder plants exposed for 3 mo. to a constant ratio (1:1/3) of MCPA and ioxynil or bromoxynil, MCPA was translocated to all parts of the plants within the first 1 to 2 days. In both species and also in beans MCPA was converted into 2 major metabolites with *Rf* values of 0.7 and 1.3 relative to MCPA. The slower-moving metabolite chromatographed identically with an unidentified plant constituent which fluoresced under UV. Metabolism of MCPA by carboxyl group degradation was apparently of minor importance. The woody parts, less susceptible to injury, were more active than the leaves in metabolizing MCPA, particularly in the presence of oxynils.

74-1679. Poland, A.; Glover, E. (Dept. Pharmacol. and Toxicol., Univ. Rochester Sch. Med. and Dentistry, Rochester, NY 14642). **Comparison of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, a potent inducer of aryl hydrocarbon hydroxylase, with 3-methylcholanthrene.** *Mol. Pharmacol. 10(2): 349-359; 1974.* (36 references)

The effects of 2,3,7,8-tetrachlordibenzo-*p*-dioxin (TCDD) on the induction of microsomal oxygenase were studied in the rat. TCDD was 3×10^4 times more potent than 3-methylcholanthrene (MC) as an inducer of hepatic aryl hydrocarbon hydroxylase. Half-maximal induction occurred at a dose of 0.85 nmole/kg. TCDD and MC produced parallel log dose-response curves for the induction of hepatic aryl hydrocarbon hydroxylase, with the same maximal response. The simultaneous administration of maximally inducing doses of both drugs produced no greater response than either drug alone. TCDD, like MC, induced a spectrally distinct type of cytochrome P-450, with a shift in the absorption maximum of the carbon monoxide difference spectrum from 450 nm to 448 nm, and an increase in the ratio of the 455 nm:430 nm absorption maxima of the ethyl isocyanide difference spectra. Following a single dose of TCDD (31.1 nmoles/kg), hepatic aryl hydrocarbon hydroxylase activity and microsomal hemoprotein remained elevated for over 35 days. Both TCDD and MC had little effect on hepatic aminopyrine *N*-demethylase and NADPH-cytochrome *c* reductase. The dose of TCDD which produced half-maximal induction of hepatic aryl hydrocarbon hydroxylase in the rat, chick embryo, and several strains of mice was similar, varying from 0.4 to 1.2 nmoles/kg. ,(Author abstract by permission of Academic Press)

74-1680. Zudova, Z.; Sram, R. J. (Inst. Hyg. Epidemiol., Prague, Czechoslovakia). **Effects of dose-fractionation on the frequency of chromosomal aberrations induced by TEPA.** *Mutat. Res. 21(1): 53; 1973.*

Male ICR mice were given 1 mg/kg TEPA according to the following schedules: Group A, single dose; Group B, two equal doses at an interval of 4 hr; Group C, two equal doses at an interval of 12 hr; Group D, two equal doses at an interval of 24 hr; Group E, five equal doses at intervals of 12 hr; Group F, five equal doses at intervals of 24 hr; Group G, 10 equal doses at intervals of 24 hr. Over the next 8 weeks each animal was then mated with two females per week. After 12 weeks spermatocytes from these animals at the diakinesis/first metaphase stage of meiosis were examined for chromosomal rearrangements and changes in chromosome number. In the dominant lethal test the most clear-cut effect at the postmeiotic stage was found in Group G, and in Group F the effect was pronounced for the premeiotic stages. There were signficant differences among the various groups, mainly expressed as an increase in the dominant lethals in the fractionated dose series. Within the fractionated series, the relative increases in chromosome rearrangements were nonsignificant, while the disjunction of the X-Y chromosomes increased significantly in all groups.

74-1681. Mohn, G. (Zentrallab. fuer Mutagenitaetspruefung der DFG, Freiburg/Br., Germany). **Comparison of the mutagenic activity of eight organophosphorus insecticides in *Escherichia coli*.** *Mutat. Res. 21(4): 196; 1973.*

Mutations conferring resistance to the inhibitory action of the amino acid analog 5-methyl-DL-tryptophan (MTR mutations) can occur on at least four genes in *Escherichia coli*, and can be of several types including deletions. The 5-MTR system was used to compare the overall mutagenic activity of three reference mutagens and of eight organophosphate insecticides, all monofunctional alkylating agents. Dichlorvos, oxydemeton-methyl, dimethoate, and bidrin showed definite mutagenic activity; methyl parathion is probably mutagenic; and parathion, malathion, and diazinon are not mutagenic under the conditions used. Results are similar to those obtained using the streptomycin resistance system in *E. coli* and the *trp* conversion system of *Saccharomyces cerevesiae*.

74-1682. Barnett, M. J.; Maxwell, W. A.; Skinner, W. A. (Stanford Res. Inst., Menlo Park, CA). **Mutagenic effects**

of aziridine-derived rodent antifertility compounds. *Mutat. Res. 21(4): 210; 1973.*

Two alkylating aziridine derivatives, *N,N'*-bis-(aziridineacetyl)-1,8-octamethylenediamine and *N,N'*-bis(aziridineacetyl)-1,4-cyclohexyldimethylenediamine, have been suggested for use in controlling rodent populations because of their antispermatogenic activity in rats and mice. The agents induced chromosome aberrations in rat bone marrow cells and were also mutagenic in the in vitro microbial forward mutational system developed by Ames. Neither compound gave positive results in another study using the dominant lethal test.

74-1683. Elespuru, R.; Setlow, J.; Lijinsky, W. (Univ. Tennessee, Oak Ridge Graduate School of Biomed. Sci., Oak Ridge, TN). **Nitrosocarbaryl, a new mutagen of environmental significance.** *Mutat. Res. 21(4): 218; 1973.*

The interaction in acid media of carbaryl with the commonly used food additive sodium nitrite has been shown to produce a potent mutagen, nitrosocarbaryl. The product was at least an order of magnitude more potent than nitrosomethylnitroguanidine in inducing resistance to the antibiotic novobiocin in *Haemophilus influenzae*. It was also several fold more potent than nitrosomethylnitroguanidine in inducing mutation to prototrophy in a strain of *E. coli* requiring arginine. The compound could be produced in the human stomach and may have significance as a mutagen in man.

74-1684. Grant, W. F. (Genetics Lab., Macdonald Campus of McGill Univ., Montreal, Quebec, Canada). **Cytological effects of environmental mutagens—pesticides.** *Mutat. Res. 21(4): 221-222; 1973.*

Cytological effects of pesticides range from not observable to greater than those of certain known mutagens. They are generally radiomimetic and include failure of cell wall division (BHC), cell wall formation (linuron, trifluralin), antimitotic action (endothall, parathion, propanil, rotenone), swelling of nuclei (nitralin), paling or haziness of chromosomes (nitralin), chromosome clumping (demeton, linuron, mevinphos, nitralin), chromosome contraction (mercuric compounds), and many others. Aldrin, chlordane, dieldrin, DDT, endrin, heptachlor, and lindane cause chromosome breakage. Captan, dichloran, and other fungicides produce various chromosome aberrations. Level of ploidy, life form, nuclear volume and interphase chromosome volume, as well as synergism (alcohol), may account for differences in sensitivity of organisms to pesticide treatment.

74-1685. Kada, T.; Sadaie, Y.; Shirasu, Y. (Dept. Induced Mutat., Nat. Inst. Genetics, Mishima, Japan). **Detection of frameshift mutagens in pesticides by "rec-assay" procedures.** *Mutat. Res. 21(4): 222-223; 1973.*

A simple method designed for screening chemical mutagens, based on the sensitivity of recombination-deficient cells to DNA-damage, was useful in detecting frameshift mutations. Strain M45 showed the highest sensitivity and probably carries a new *rec* gene in addition to *rec*A. During a screen of a number of pesticides at least five chemicals were clearly positive and two (2,4-dinitrophenylthiocyanate and sodium *p*-dimethylaminobenzenediazosulfonate) were potent frameshift mutagens.

74-1686. Bridges, B. A.; Mottershead, R. P.; Colella, C. (MRC Cell Mutation Unit, Univ. Sussex, Falmer, Brighton BN1 9QG, England). **Induction of forward mutations of colicin E2 resistance in repair deficient strains of *Escherichia coli*: experiments with ultraviolet light and captan.** *Mutat. Res. 21(3): 303-313; 1973.* (8 references)

Captan induced mutations in the Uvr^+ strain of *E. coli* at levels as low as 2 μg/ml and in the Uvr^- at 0.1 μg/ml. The exrA strains tested were more sensitive to captan than their exr^+ counterparts, and it was difficult to determine mutability. There was no indication of induction of mutations in these strains or in the Trp^+ strains. The potential hazard of captan to man is probably limited by poor solubility and avidity for sulfhydryl groups, both of which would reduce the amount reaching the gonads. The possibility of mutagenic action on somatic cells, as around a captan particle inhaled in the lung, should, however, be considered.

74-1687. Siebert, D.; Lemperle, E. (Forstbotanisches Inst., Univ. Freiburg. Br., Freiburg, Germany). **Genetic effects of herbicides: induction of mitotic gene conversion in *Saccharomyces cerevisiae*.** *Mutat. Res. 22(2): 111-120; 1974.* (33 references)

Two of 32 herbicides tested induced mitotic gene conversion in a diploid strain of the ascomycete *Saccharomyces cerevisiae* heteroallelic at two loci. Reglone (diquat) induced a 7- and 4- to 5-fold increase in conversion frequency over the respective control in the *ade*2 locus and the *trp*5 locus. 2,4-D induced an increase of 5- and 6-fold, resepectively, in the *ade*2 locus and the *trp*5 locus. These increases were small compared to those induced by other known mutagens. Betanal (phenmedipham), Butisan (prynochlor), Aretit (dinoseb acetate), flurecol, Gramoxone (paraquat), and Ronstar (oxadiazon) inactivated yeast at a concentration of 1000 ppm.

74-1688. Siebert, D.; Eisenbrand, G. (Inst. Forest Botany, Univ. Freiburg i. Br., Freiburg, Germany). **Induction of mitotic gene conversion in *Saccharomyces cerevisiae* by *N*-nitrosated pesticides.** *Mutat. Res. 22(2): 121-126; 1974.* (16 references)

Benzthiazuron, propoxur, and carbaryl had no influence on the frequency of mitotic gene conversions

in a diploid strain of *Saccharomyces cerevisiae* heteroallelic at the gene loci *ade*2 and *trp*5. Their *N*-nitroso derivatives, however, had marked convertogenic activities. *N*-nitrosocarbaryl was the most active compound tested, with a relative conversion frequency increase of 139-fold for the *ade*2 and 885-fold for the *trp*5 locus. *N*-nitrosocarbamates induced more mitotic gene conversions than substituted *N*-nitrosomethylurea. The results suggest that in establishing tolerance levels for pesticide residues the possibility of undergoing *N*-nitrosation in the human intestinal tract or in the environment to yield a genetically highly active material should be considered.

74-1689. Kappas, A.; Georgopoulos, S. G.; Hastie, A. C. (Biol. Dept., Nuclear Res. Cent. "Democritus", Athens, Greece). **On the genetic activity of benzimidazole and thiophanate fungicides on diploid *Aspergillus nidulans*.** *Mutat. Res. 26(1): 17-27; 1974.* (28 references)

Of the nine compounds tested for their effect on genetic segregation in the diploid strain of *Aspergillus nidulans*, DTFB (4,5-dichloro-2-trifluoromethylbenzimidazole) and TTFB (4,5,6-trichloro-2-trifluoromethyl benzimidazole) never increased the number of sectors over that observed in controls. Benzimidazole did not cause genetic segregation but concentrations used were also not fungitoxic. BMC, benomyl, thiabendazole, thiophanate methyl, thiophanate, and 2-(3-methoxycarbonyl thioureido)aniline greatly increased the number of diploid and particularly haploid segregants. The results indicated that primary genetic changes were induced, and although increased frequency of mitotic crossing-over is a possibility, non-disjunction was probably the main effect.

74-1690. Kihlman, B. A.; Sturelid, S.; Hartley-Asp, B.; Nilsson, K. (Dept. Genetics Plant Breeding, Royal Agr. Coll. Sweden, Uppsala, Sweden). **The enhancement by caffeine of the frequencies of chromosomal aberrations induced in plant and animal cells by chemical and physical agents.** *Mutat. Res. 26(2): 105-122; 1974.* (81 references)

The frequencies of chromosomal aberrations produced in plant (*Vicia faba* and *Allium proliferum*) and animal (diploid Chinese hamster and hypotetraploid human) cells by maleic hydrazide (MH), 4-nitroquinoline-1-oxide (4NQO), ultraviolet irradiation, and a number of mono- and poly-functional alkylating agents was dramatically increased by post-treatment with caffeine. Results with maleic hydrazide indicate that potentiation is obtainable only when the cells are exposed to caffeine during the S-phase. Caffeine potentiated thio-tepa-induced chromosome damage in the plant and Chinese hamster cells but not in the human cells. The potentiating effects of eight methylated oxypurines on the chromosome damage produced by thio-tepa in Chinese hamster and *Vicia faba* cells was studied. Caffeine produced the strongest potentiation in the plant cells, while S-chlorocaffeine produced the strongest potentiation in the hamster cells. Tetramethyluric acid had little potentiating activity in either cell type. In *Vicia faba*, a 5-hour post-treatment with 2.5×10^{-3} *M* caffeine increased the thio-tepa-induced aberration frequency nearly 8-fold when the caffeine was applied 5 hours after the pesticide at 25°C. Post-treatment with caffeine at 10°C was almost without effect. Temperature had little effect on the caffeine potentiation of the chromosome damage produced by MH, azaserine, and methanesulfonate.

74-1691. Pasi, A.; Embree, J. W., Jr.; Eisenlord, G. H.; Hine, C. H. (Dept. Pharmacol., Univ. California, San Francisco, CA). **Assessment of the mutagenic properties of diquat and paraquat in the murine dominant lethal test.** *Mutat. Res. 26(3): 171-175; 1974.* (19 references)

The dominant lethal test was used to assess the mutagenic potentials of diquat and paraquat in fertile male Swiss-Webster mice. The pesticides did not significantly increase the rates of postimplantational early fetal deaths or preimplantational egg losses in the females mated with the treated males, indicating that neither chemical exerted mutagenic effects on any maturation stage of spermatogenesis. However, both diquat and paraquat had marked antifertility effects, as indicated by significantly reduced pregnancy rates among females mated with the treated males. The antifertility effect of paraquat was restricted to the postmeiotic late spermatids, while the effect of diquat covered all postmeiotic maturation stages as well as premeiotic early and late spermatocytes.

74-1692. Styles, J. A.; Garner, R. (Imp. Chem. Ind Ltd., Ind. Hygiene Res. Labs., Alderley Pk., Cheshire, Great Britain). **Benzimidazolecarbamate methyl ester—evaluation of its effects in vivo and in vitro.** *Mutat. Res. 26(3): 177-187; 1974.* (13 references)

The cytopathic action of the fungicide benzimidazolecarbamate methyl ester (BMC) was investigated on specific-pathogen-free Wistar rats and various mammalian cell lines (human adult liver, HeLa, mouse connective tissue, Syrian hamster kidney, and Chinese hamster lung). In the tissue culture experiments BMC caused pyknosis (at concentrations of 10^{-2} to 10^{-3} *M*), arrested metaphases, pyknotic nuclei, and morphologically abnormal nuclei (10^{-4} to 10^{-5} *M*) after 24 hours incubation. After 4 hours incubation, BMC (10^{-5} *M* and above) caused metaphase arrest. Numerous mitotic abnormalities were found in bone marrow samples taken from rats 4 hours after oral administration of BMC. Chromosome breakages and bridge formation also occurred at a low incidence. The in vitro toxicity of BMC is similar to that of methylbenzothiadiazine (PP 010) and benomyl. A host-mediated assay using serum from animals dosed with BMC or related compounds revealed that the cytotoxicity of sera following the i.p.

administration of BMC, PP 010, or benomyl were similar. However, following oral dosing, the cytotoxicity of the sera from the benomyl-treated rats was 10-fold lower.

74-1693. Seiler, J. P. (Swiss Fed. Res. Sta., Wadenswil, Switzerland). **Ethylenethiourea (ETU), a carcinogenic and mutagenic metabolite of ethylenebis-dithiocarbamate.** *Mutat. Res. 26(3): 189-191; 1974.* (19 references)

Ethylenebis-dithiocarbamate dissolved in dimethylsulfoxide was applied to cultures of *Salmonella typhimurium* strain his G-46, and the mutagenic effects of the metabolite ethylenethiourea (ETU) were studied. ETU in moderate concentrations caused small but reproducible changes in mutation frequency through base substitutions. At higher concentrations, ETU killed otherwise viable bacteria, thereby preventing colony formation.

74-1694. Zetler, G. (Inst. fuer Pharmakologie, Medizinische Akademie Lubeck, Lubeck, Germany). **Drug-induced catalepsy as influenced by convulsant and anticonvulsant drugs.** *Neuropharmacology 12: 741-749; 1973.* (25 references)

The convulsant drugs bemegride, nikethamide, pentylenetetrazol, and caffeine enhanced the cataleptic action of bulbocapnine, haloperidol, and trifluoperazine in male NMRI mice. The convulsants did not affect the catalepsy induced by arecoline, pilocarpine, or tremorine, and they enhanced the catalepsy induced by tetrabenazine, paraoxon, lobeline, and nicotine in an irregular manner. All of the convulsants except nikethamide induced catalepsy when given alone; this state was not antagonized by anticonvulsants. The catalepsy induced by nonconvulsant cataleptogens was antagonized by phenytoin and mephenytoin, but not by trimethadione, ethosuximide, phenacemide, or carbamazepine. Phenytoin interrupted fully the catalepsy induced by haloperidol and tetrabenazine. The data suggests that catalepsy is a consequence of central stimulation rather than depression.

74-1695. Overstreet, D. H.; Kozar, M. D.; Lynch, G. S. (Dept. Psychobiol., Univ. California, Irvine, CA 92664). **Reduced hypothermic effects of cholinomimetic agents following chronic anticholinesterase treatment.** *Neuropharmacology 12(11): 1017-1032; 1973.* (33 references)

A series of experiments were undertaken with male Sprague-Dawley rats to assess the development of thermoregulatory tolerance to the chronic administration of diisopropylfluorophosphate (DFP) and to correlate this process with changes in the responsiveness of the anterior hypothalamus to cholinergic stimulation. Thermoregulatory tolerance to DFP developed rapidly, with the third injection of the compound producing little or no hypothermia. The hypothermic effects of systemically administered pilocarpine, a tertiary cholinomimetic agent, were reduced or eliminated following chronic treatment with DFP. Similarly, the hypothermic effects of intrahypothalamically administered carbachol were reduced following chronic DFP treatment. These results along with previous data indicate that the muscarinic cholinergic receptors in the anterior hypothalamus may be altered in their sensitivity to acetylcholine; and this may be one mechanism underlying the development of tolerance to DFP.

74-1696. Joy, R. M. (Dept. Physiol. Sci., Sch. Vet. Med., Univ. California, Davis, CA). **Alteration of sensory and motor evoked responses by dieldrin.** *Neuropharmacology 13(2): 93-110; 1974.* (51 references)

The effects of dieldrin on the CNS responses evoked by the stimulation of peripheral and central pathways were studied in 53 male cats. The postsynaptic components of the cortical responses to any modality of sensory stimulation were facilitated by the pesticide, while the subcortical potentials were merely depressed. Similar post-synaptic facilitation occurred with direct cortical and transcallosal stimulation. The cortical and peduncular responses to the stimulation of fibers in the brachium conjunctivum and ventralis lateralis were moderately depressed. A late positive-negative potential developed over the frontal cortical areas; this potential was indistinguishable from the irradiation potential produced by metrazol. The late wave was the source of the spike discharges which developed in the EEG records. The data supports the hypothesis that dieldrin and metrazol share either a common mechanism of action or final common pathways responsible for electrophysiological events.

74-1697. Kozuke, H.; Yoshiba, S.; Shikano, K.; Oshima, K. (Sch. of Hyg., Jikei Univ., Sch. of Med., Tokyo, Japan.) **Experimental studies on the appearance of basophilic stippled erythrocytes after concurrent administration of lead acetate and DDT.** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 146; 1974.* (Japanese)

The respective maximum daily doses of DDT (1.0% emulsion) and lead acetate (1.8% aqueous solution) which did not induce basophilic stippled erythrocytes (BSE) in rabbits were 0.8 and 0.2 mg/kg, given for seven consecutive days. After administration of both compounds concomitantly to male rabbits, the erythrocytes were examined under a luminescence microscope after staining with acridine orange. Rabbits given more than the maximum no-effect dose had BSE beginning the second day of administration, with the number of BSE rising sharply and dropping rapidly after the end of administration. Rabbits given both agents at the respective maximum no-effect doses showed increased BSE, the presence of BSE continuing on a plateau for one week, then disappearing two weeks after the beginning of administration. Rabbits given both agents at half the

maximal dose did not have BSE. Reticulocytes appeared in animals given amounts exceeding the no-effect level; however, the number was lower in animals given lead acetate. Smaller numbers of reticulocytes were seen in rabbits given both agents at their maximum no-effect doses. A synergistic effect seems to exist between lead acetate and DDT.

74-1698. Nishiyama, K.; Sato, I.; Usuya, S. (Sch. of Pub. Health, Fac. of Med., Hirosaki Univ., Hirosaki, Aomori, Japan). **[Studies on preventing pesticidal injuries in apple growing work: On the amount of exposure to organophosphorus pesticides and their movement in blood.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 205; 1974.* (Japanese)

The amount of pesticides inhaled by a driver of a pesticide speed-sprayer was determined using an impinger-type personal sampler. Pesticidal movement in blood of the driver was analyzed and the metabolites in the urine determined. The study was carried out from June to Aug. 1973 on an operator and his assistant engaging in preparation and transportation of fenitrothion and salithion in an apple orchard. The amount of pesticide inhaled, the amount of fenitrothion excreted in urine, the amount of pesticides in blood, and GOT, GPT, and ChE levels were determined. The amount of the organophosphorus pesticides inhaled was 75.5 micrograms/driver/day even with ten applications a day, the amount being extremely small. The amount of *p*-nitro-*m*-cresol in urine after one day was 0.362 ± 0.275 mg/day for the driver and 0.575 mg/day for the assistant. Blood of the driver and assistant contained fenitrothion or salithion just after application at 0.013-0.042 micrograms/2 ml of serum. The amounts decreased to traces or not detectable after 36 hr. Liver function did not change before and after application.

74-1699. Kawamura, A.; Ogata, S.; Shigeno, K.; Nishimura, M.; Someya, N.; Ueda, K. (Sch. of Intern. Med., Tokyo Dental College, Tokyo, Japan). **[On the effects of long term administration of an organophosphorus pesticide to male beagles.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 216; 1974.* (Japanese)

Fenitrothion was administered to three beagles at 5 mg/kg/day for 10 months. Effects were determined by studies of plasma and erythrocyte ChE activities, examination of peripheral blood, biochemical examination of blood (GOT, GPT, alkaline phosphatase, and BUN), ophthalmological examination, and examination of EMG induced by stimulation. Both blood and erythrocyte ChE began to decrease from the third week and reached low stable values about the third month. Plasma ChE activity did not decrease much, but was lower than that of control. A slight but not abnormal change was found in RBC, WBC, Hb, and platelet count. GOT, GPT, alkaline phosphatase, and BUN values did not differ from those in controls. The corneal radius of curvature was noticeably reduced in experimental animals and controls until growth stopped when there was no difference between groups. Noticeable abnormalities of pupil diameter and of light reflex were not observed by gross examination; intraocular pressure, refraction, and fundus were normal. EMG from musculi flexor digitorum superficialis was not different between experimental animals and controls in either latency or stimulation.

74-1700. Shirakawa, M. (School of Public Health, Faculty of Med., Kurume Univ., Kurume, Fukuoka, Japan). **[An experimental study on the subchronic (subacute) toxicity of a new herbicide, phenothiol.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 218; 1974.* (Japanese)

Phenothiol, *S*-ethyl-(4-chloro-2-methyl)phenoxy thioacetate, a white crystalline material with m.p. 41-42°C, b.p. 140-141°C solution in organic solvents and poorly soluble in water (23 ppm at 225.5°C), has recently been developed as a herbicide. The acute oral LD50 to male mice was found as 1670.9 mg/kg, to female mice 1606.4 mg/kg, to male rats 960 mg/kg, and to female rats 928 mg/kg when injected into the stomach as a 6% emulsion in a 1% aqueous gelatin solution. In subchronic toxicity tests, phenothiol was mixed with Oriental solid diet at rates of 30, 100, 300, and 1000 ppm and fed to five groups of mice and rats each for three months. After observation of symptoms, behavior, weight gain, and feed and water intake for three months, the animals were sacrificed for pathohistological examination of blood (RBC, WBC, Hb, and Ht), serum GOT and GPT, organ weights and organs. The intake of feed and water increased proportionally with the concentration. The weight gains were normal; no abnormal behavior or pathological symptoms were observed. The organ weights and their relationship to body weight were normal. Hematological and biochemical findings were normal. Interstitial nephritis, seminiferous tubules clogged with necrotic materials, and a slight change in the primitive layer of cerebral cortex were found in mice, whereas in rats these pathological findings were more slight. No appreciable differences were seen between the experimental animals and controls, thus the toxicity of phenothiol is very low.

74-1701. Bossen, F.; Karlog, O.; Rasmussen, F. (Afdelingen for farmakologi og toksikologi, Den kgl. Veterinaer og Landbohojskole, Copenhagen, Denmark). **Kolinesteraseaktiviteten i blodlegemer og blodplasma efter oral indgift af Atgard vet. R. (dichlorvos) til svin. [The cholinesterase activity in red blood cells and blood plasma after oral intake of Atgard vet. R (dichlorvos) in pigs.]** *Nord. Veterinaermed. 25(11): 584-587; 1973.* (5 references) (Danish)

Cholinesterase activities in red blood cells and in blood plasma were studied in 11 pigs after oral adminis-

tration of single doses of 50, 100, or 200 mg dichlorvos per kg of body weight for eight weeks. The cholinesterase activities in both red blood cells and blood plasma were reduced in all cases. Initially, cholinesterase activity was more inhibited in the blood plasma than in red blood cells. After administration of 50 mg of dichlorvos per kg, the cholinesterase activity in the red blood cells fell to about 65% of the normal value in 48 hr, and that in the blood plasma about 30% of the normal level in 24 hr. The enzyme activity rose to 80-90% of the normal value in 8 weeks after dichlorvos application. In pigs fed 100 mg of dichlorvos per kg the cholinesterase activity in the red blood cells fell to 30% in 24 hr, and that in the blood plasma fell to 0-12% in 6 hr. The enzyme activity reached 80% of the normal value in eight weeks. The pigs fed 50 or 100 mg/kg doses of dichlorvos did not evince clinical symptoms of poisoning. In one pig fed 200 mg/kg dose of dichlorvos the only symptom of poisoning was repeated vomiting 2 and 6 hrs after administration.

74-1702. Young, M. L.; Mitchell, G. V.; Seward, C. R.; Adkins, J. S. (Div. Nutr., Food Drug Admin., U.S. Dept. Health, Educ. and Welfare, Washington, D.C. 20204). **Effect of methionine on liver lipids, vitamin A, and fatty acids in rats fed amino acid diets containing DDT.** *Nutr. Rep. Int. 9(1): 1-8; 1974.* (16 references)

Male weanling Holtzman rats were fed a purified amino acid diet (equivalent to 19% protein) supplemented with 0.4, 1.0, or 2.0% DL-methionine and 50, 100, or 200 ppm DDT. There were no significant changes in growth at 0.4 or 1.0% methionine, but growth was depressed by 13%, and total liver lipid was significantly elevated at 2.0% methionine. The amount of vitamin A stored in the liver decreased with increasing DDT levels at all methionine levels. As the level of methionine increased, liver vitamin A decreased significantly in animals fed 100 and 200 ppm DDT. Thus, the dietary levels of both DDT and methionine affect the hepatic storage of vitamin A in rats maintained on a purified amino acid diet.

74-1703. Fang, S. C.; Fallin, E.; Montgomery, M. L.; Freed, V. H. (Dept. Agr. Chem., Oregon State Univ., Corvallis, OR 97331). **Metabolic studies of ^{14}C-labeled propham and chlorpropham in the female rat.** *Pestic. Biochem. Physiol. 4(1): 1-11; 1974.* (10 references)

Female Wistar rats were given a single oral dose of ^{14}C-labeled propham or chlorpropham, after which the tissue distribution and excretion of the pesticide were studied. The average 3-day urinary excretions of radioactivity were 55.9%, 82.6%, 79.5%, and 85.4% of an oral dose of chain (^{14}C) chlorpropham, ring (^{14}C) chlorpropham, chain (^{14}C) propham, and ring (^{14}C) propham, respectively. With chain chlorpropham 35.4 ± 7.5% of the administered dose was excreted in the respired air, whereas only 5.0 ± 0.8% was found in the carbon dioxide from the chain propham. There was no significant difference in the rate of excretion or the route of elimination among rats receiving different oral dosages. The radioactivity was distributed throughout all tissues, with the highest concentration found in the kidney. In most tissues the average biological half-life of the ^{14}C from chlorpropham and propham was about 3 to 8 hours. However, in the brain, fat, and muscle, the half life was about twice as long. Both compounds were metabolized by hydrolytic and oxidative mechanisms and the resulting metabolites were excreted in either free or conjugated forms. Following oral administration of chlorpropham or propham, the percentage distribution of ^{14}C in the particulate and soluble fractions of the kidney and liver was dependent on the time since dosing.

74-1704. Welling, W.; De Vries, A. W.; Voerman, S. (Lab. Res. Insecticides, Wageningen, The Netherlands). **Oxidative cleavage of a carboxyester bond as a mechanism of resistance to malaoxon in houseflies.** *Pestic. Biochem. Physiol. 4(1): 31-43; 1974.* (33 references)

The synergistic effect of triphenyl phosphate (a carboxyesterase inhibitor), sesamex (an inhibitor of microsomal oxidation), and *O,O*-diethyl *O*-phenyl phosphorothioate was studied on the toxicity of malathion and malaoxon for one susceptible and two resistant strains of housefly. In one resistant strain, G (characterized by high carboxyesterase activity), both malathion and malaoxon were synergized by triphenyl phosphate, but only malaoxon was synergized by sesamex. In the other resistant strain, E 1, which is moderately tolerant of malathion and highly resistant to malaoxon, triphenyl phosphate had no effect; the response of E 1 to sesamex was similar to that of G. In both strains *O,O*-diethyl *O*-phenyl phosphorothioate produced the greatest synergistic effects. Both resistant strains could degrade malaoxon oxidatively at a much higher rate than the susceptible strain. This oxidation could be inhibited by very low concentrations of the thiono analog; the metabolite formed was identified as malaoxon β-monocarboxylic acid. The data indicates that houseflies may become resistant to malaoxon via an increased rate of oxidative carboxyester bond cleavage.

74-1705. Gilbert, M. D.; Wilkinson, C. F. (Dept. Entomol., Cornell Univ., Ithaca, NY 14850). **Microsomal oxidases in the honey bee, *Apis mellifera* (L.).** *Pestic. Biochem. Physiol. 4(1): 56-66; 1974.* (33 references)

Epoxidase, hydroxylase, and *O*-demethylase activities were studied in larvae and adults of the honey bee, *Apis mellifera* (L). In adult drone and worker bees oxidase activity was observed only in intact tissues, particularly the midgut; this activity was lost completely after homogenization. The enzymes required NADPH and oxygen for maximum activity and were inhibited by carbon monoxide and insecticide synergists (benzothia-

diazole derivatives and piperonyl butoxide). Oxidase activity was associated with smooth and rough vesicles probably derived from the endoplasmic reticulum in electron micrographic preparations. Adult worker honey bees readily metabolized aldrin in vivo following topical application. The level of epoxidation activity was similar to that in the housefly. Dieldrin was the only metabolite observed in extracts from aldrin-treated bees, and aldrin and dieldrin accounted for all the recovered chlorohydrocarbons 5 hr after treatment. The recovery of some dieldrin in the rinse solutions of honey bees was an unexpected finding.

74-1706. Suzuki, T.; Miyamoto, J. (Res. Dept. Pesticides Div., Sumitomo Chem. Co., Ltd., Takatsukasa, Takarazuka, Hyogo, Japan). **Metabolism of tetramethrin in houseflies and rats in vitro.** *Pestic. Biochem. Physiol. 4(1): 86-97; 1974.* (26 references)

The degradation of radiolabeled tetramethrin and 3,4,5,6-tetrahydrophthalimidomethyl *dl-trans* chrysanthemumate was tested in vitro using the abdomens of SK, lab-em-7-em, R-HOKOTA, and Py strains of houseflies and rat liver. $NADH_2$ and $NADPH_2$ slightly inhibited the metabolism of tetramethrin by the housefly abdomen homogenate, while the phosphorothioates, their oxygen analogs, carbamate insecticides, NIA 16388, *p*-chloromercuribenzoic acid, and mercuric chloride inhibited it markedly. The enzyme activity was localized primarily in the microsomal fraction where the major metabolites were 3,4,5,6-tetrahydrophthalimide (TPI) and chrysanthemumic acid. Smaller amounts of oxidized tetramethrins and chrysanthemumic acids were also produced. The cleavage of tetramethrin into *N*-(hydroxymethyl) 3,4,5,6-tetrahydrophthalimide (MTI) and chrysanthemumic acid was inhibited by compounds such as paraoxon, carbaryl, PCMB, NIA 16388, and mercuric chloride. $NADPH_2$ and $NADPH_2$ plus carbon monoxide had little effect. Similar results were obtained with the rat liver microsomal fraction. The data indicates that the cleavage is catalyzed by a carboxyesterase or a hydrolase and that some pyrethroids are metabolized in insects primarily via hydrolytic pathways. Metabolites from oxidative pathways are formed in minor quantities.

74-1707. Beynon, K. I.; Roberts, T. R.; Wright, A. N. (Shell Res. Ltd., Sittingbourne, Kent, Great Britain). **The degradation of the herbicide benzoylprop ethyl on the foliage of cereal seedlings.** *Pestic. Biochem. Physiol. 4(1): 98-107; 1974.* (16 references)

The breakdown of the herbicide benzoylprop ethyl was examined in wheat, oat, and barley seedlings following the application of the ^{14}C-labeled herbicide to the foliage. The route and rate of chemical breakdown was similar in all three species within 15 days of application. Some of the herbicide was present in the plants in a complexed form which could be extracted from the plant with organic solvents and converted back into the herbicide on treatment with hot acid. Evidence was also obtained for hydrolysis of the herbicide in the plant to give its des-ethyl analog which conjugated with plant sugars. There was some evidence for a small degree of degradation of benzoylprop ethyl by debenzoylation to give products which also conjugated or complexed. There was no evidence for the formation of 3,4-dichloroaniline in the plants, and no differences were found to account for the different tolerances of the three species to the herbicide.

74-1708. Foley, D. J.; Stritzel, R. E.; McPhillips, J. J. (Dept. Pharmacol., West Virginia Univ. Med. Cent., Morgantown, WV). **The relationship between inhibition of acetylcholinesterase and sensitivity of the rat ileum to carbachol.** *Pharmacology 10(5): 298-305; 1973.* (14 references)

Female albino rats were injected i.p. with solutions of disulfoton, echothiophate iodide, schradan (OMPA), and parathion, after which the spasmogenic action of carbachol was examined. With repeated injections of disulfoton, the sensitivity of the ileum to carbachol decreased progressively, returning to normal 5 to 8 days after disulfoton treatment was stopped. The subsensitivity of the ileum to carbachol persisted after the tissue acetylcholinesterase had returned to normal. The effects of disulfoton were dose related. Echothiophate and OMPA similarly decreased the sensitivity of the ileum to carbachol, while parathion had a less pronounced effect.

74-1709. Rankov, V. (The Maritsa Vegetable Crop Institute, Plovdiv, Bulgaria). **Nitrifitsirashta aktivnost na nyakoi pochvi pri tretirane s kherbitsidi i torene. [Nitrification activity of some soils treated with herbicides and fertilizers.]** *Pochvozn. Agrokhim. 8(1): 125-134; 1973.* (13 references) (Russian)

The effect of fertilization with mineral fertilizers and manure on the change produced by the herbicides aretit (dinoseb), treflan (trifluralin), and BV-207 (3-chloro-4-methylphenyl-3-methyl-2-pyrolidinone) in the nitrification activity of alluvial-meadow, strongly leached meadow-cinnamonic, humus carbonate, and leached smolnitsa soils was studied. The respective doses of aretit, treflan, and BV-207 were 2 mg-10g/kg, 0.002 ml-9 ml/kg, and 0.002 ml-10 ml/kg of soil. The fields were fertilized with manure at a rate of 30 to 120 tons per ha, or with phosphorus and potassium fertilizers corresponding to 240, 480, and 960 kg of phosphorus pentoxide and 480 kg of potassium oxide per ha. The herbicide-induced inhibition of the soil nitrification activity was most pronounced in light, slightly humus soils. Manure reduced the inhibitory effect of aretit on the nitrifying activity more markedly than the potassium and phosphorus fertilizers did. The decrease of the nitrification-inhibiting effect was most pronounced in soils with a heavier textural composition and richer in organic matter.

74-1710. Brzezinski, J. (Dept. Toxicol. Chem., Inst. Biopharmacy, Med. Acad., 02-097 Warsaw, Poland). **The effect of atropine on the levels of adrenaline and noradrenaline changed by acute poisoning with disyston in rats.** *Pol. J. Pharmacol. Pharm. 25(6): 611-615; 1973.* (8 references)

Rats poisoned with 0.4 LD50 disyston (disulfoton) and treated with atropine excreted less adrenaline and more noradrenaline during the 5-day observation period than rats given only disyston. The difference was greatest in the first 24 hr. In adrenals, the noradrenaline level decreased not only below the elevated levels observed after disyston treatment, but below physiological values. Plasma catecholamines were transiently elevated in atropine-disyston animals. The changes observed are probably related to the influence of atropine on the pharmacological properties (muscarinic action) of acetylcholine.

74-1711. Wysocka-Paruszewska, B. (Dept. Toxicol. Chem., Inst. Biopharm., Med. Acad., 02-097 Warsaw, Poland). **The effect of fenitrothion on the excretion of 4-hydroxy-3-methoxymandelic acid with rat urine.** *Pol. J. Pharmacol. Pharm. 25(6): 617-620; 1973.* (14 references)

A significant increase in HMMA (4-hydroxy-3-methoxymandelic acid) excretion was observed between the second and fifth days after treatment of rats with 0.5 LD50 fenitrothion, an organophosphate of low toxicity. AChE activity, although recovering, was depressed 34% seven days after treatment. The increase in urinary HMMA was less marked and observed at a later time in animals treated with fenitrothion than in animals poisoned by more toxic organophosphates. Differences in the excretion of HMMA may be related to differences in liberation of catecholamines from brain and adrenals.

74-1712. Call, D. J.; Call, J. K. J. (Exp. Sta. Biochem. Dept., South Dakota State Univ., Brookings, SD 57006). **Blood chemistries of Japanese quail fed dieldrin.** *Poultry Sci. 53(1): 54-56; 1974.* (10 references)

Groups of seven-week-old Japanese quail (*Coturnix coturnix japonica*) were placed on 14-day ad lib control and dieldrin diets of 5, 10, 16, and 75 ppm. A total of 75 birds were used for serum chemical analyses. Serum total lipids were significantly elevated ($P<.01$) on the 5, 15, and 75 ppm treatments. Dieldrin treatments did not result in significant changes in serum calcium, total protein, inorganic phosphate or cholesterol levels. Females had significantly higher ($P<.01$) serum calcium, total protein, inorganic phosphate and total lipid levels than males, when viewed overall. (Author abstract by permission)

74-1713. Hurst, J. G.; Newcomer, W. S.; Morrison, J. A. (Dept. Physiol. and Wild Life Res. Unit, Oklahoma State Univ., Stillwater, OK 74074). **Some effects of DDT, toxaphene and polychlorinated biphenyl on thyroid function in bobwhite quail.** *Poultry Sci. 53(1): 125-133; 1974.* (12 references)

Bobwhite quail were given technical grade DDT, toxaphene or polychlorinated biphenyl (PCB) at 5, 50 or 500 ppm in their feed for 4 months. At monthly intervals groups of quail (usually 10) from each experimental group were tested and compared with control birds. Thyroid, adrenal, liver, and body weights were measured as were the 2-hour thyroidal I^{131} uptakes. Generally, only the higher dosages were effective in producing changes. DDT early increased the uptake of I^{131} by the thyroid and by 4 months the 2-hour uptake had returned toward control levels. The thyroid gland was found to be significantly enlarged after 3 months on treatment and remained enlarged thereafter. DDT produced no consistent effect on body or adrenal weights, but the livers were enlarged after 2 months on high dosage treatment. Toxaphene stimulated thyroid growth and I^{131} uptake. In the former case, the effects were statistically significant only at the 4-month period while the total thyroid uptake of I^{131} was significantly increased at 3 and 4 months on treatment. When expressed as percentage of dose of I^{131} taken up per mg of thyroid, the uptake was significantly greater after 2 and 3 months on treatment. Toxaphene in high dose rate significantly decreased body weights at all time periods studied. At all dose levels used, toxaphene seemed to produce adrenal hypertrophy by 3 months. The effect of this chemical on liver weights was slight or none at all. PCB seemed to depress thyroid size at low dose levels or early in the experiment and to stimulate growth at higher dose levels or later in the experiment. The enlarged glands of the high PCB group took up more iodide than the controls, but each unit weight of these thyroids took up the same amount of iodide as the controls. On the other hand, the thyroids from birds receiving the lower two doses of PCB took up the same amount of iodide as the controls, but each mg of thyroid took up less. PCB had no consistent effect on body weight or adrenal weight, but produced a very dramatic increase in liver weight. These results are discussed. (Author abstract by permission)

74-1714. Imaizumi, K.; Atsumi, K.; Hatano, M.; Ohara, Y.; Miyashita, H. (Fac. of Med., Iwate Med. Coll., Morioka, Japan). **[Biochemical examination of eyes of rabbits intoxicated by organophosphorus pesticides.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1163; 1973.* (Japanese)

To elucidate the specific lesions responsible for ocular symptoms such as visual acuity losses and visual field stenosis in the case of organophosphate pesticide intoxication, biochemical examinations were performed on the eyes of experimentally poisoned rabbits. Fenitrothion was administered orally at 0.5 mg/kg/day to 2-kg adult male white rabbits for six months. This dose

amounted to 1/1800 LD50 per day. Changes were seen in the composition of fatty acids in the optic nerve, iris, lens, and retina. Changes were also seen in ocular tissues of rabbits intoxicated by organochlorine and organomercury pesticides.

74-1715. Homma, S. (Livestock Hygiene Experiment Station, Ministry of Agr. and Forestry, Kodaira, Tokyo, Japan). **[Clinical symptoms and fundus findings in dogs intoxicated experimentally by organophosphorus pesticides.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1163-1164; 1973.* (Japanese)

Ethyl *p*-nitrophenyl phenylphosphonothioate (EPN) was given at the daily rate of 1.7-6.0 mg/kg, ethylthiometon at the daily rate of 2.8-5.0 mg/kg, and γ-BHC at the daily rate of 2.8-4.0 mg/kg to puppies within one year of birth and to adult dogs for several time periods. The clinical findings, including those on fundus, were reported. The initial symptoms were vomiting and diarrhea, then convulsions, disturbances of gait, and weight loss, with conspicuous decreases in true and pseudocholinesterase. Pathohistologically, degenerative changes in the tibial nerve, ventral and dorsal radix, and nerve cells of the spinal cord were noticed. At the beginning of administration, reddening of the papilla and retina and dilatation of the central vein of the retina were found. Discoloration of these was seen after a long time. A tendency to decrease in blood vessels, dilatation of nerve cell nucleus in the retina, vacuolation of protoplasm, dilatation of nerve cell axons, atrophia nervosa of the external ophthalmolar muscle, and reduction of enzymatic activity were observed. These pathological changes are closely related to the clinical symptoms. Manifestations of clinical symptoms differed greatly between strains of test animals.

74-1716. Naito, M.; Kawai, M.; Ueda, K. (Dept. Ophthalmol., Central Hosp. of Self Defence Force, Tokyo, Japan). **[Ocular disturbances due to organophosphorus pesticides for agriculture, Part 1. Quantitative and qualitative sub-chronic experiments on rats orally administered a high dose rate, LD50.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1164; 1973.* (Japanese)

Quantitative and qualitative discussions were given on the corneal protrusion and keratoconus-like changes which occurred after long term p.o. administration of organophosphorus pesticides at the high rate of LD50. The therapeutic effectiveness of topical and p.o. administration of pralidoxime, atropine, and glutathione was described. The role of the sympathetic nerves was also examined by comparison of the intoxicated animals with animals in which the jugular sympathetic nerve ganglion was removed unilaterally.

74-1717. Naito, M.; Kawai, M.; Ueda, K. (Dept. Ophthalmol., Central Hosp. of Self Defence Force, Tokyo, Japan). **[Ocular disturbances due to organophosphorus pesticides for agriculture, Part 2. Chronic experiments on rabbits sprayed with low concentrations for a long time.]** *Rinsho Ganka (Clin. Ophthalmol.) 27(9): 1164; 1973.* (Japanese)

Rabbits were exposed in a chamber to continuous spraying with organophosphates for 30 minutes to 2 hrs/day for more than 10 months, simulating conditions of exposure in the field. The corneal radii of curvature, pupillomotor system, general neurological changes, and ChE activity were determined and analyzed. Even at concentrations which produced no changes in the corneal radius of curvature, the pupillomotor system was affected.

74-1718. Oshiba, K.; Kawakita, H. (Osaka Municipal Inst. of Hyg., Osaka, Japan). **[Interactions between toxicants and nutrition, Part 6: studies on absorption and excretion of BHC in rats.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(5): 452-456; 1973.* (10 references) (Japanese)

Radiolabeled β-BHC and γ-BHC (lindane) were added to two kinds of basic diet, contaminated with 10 ppm of unlabeled β-BHC and γ-BHC respectively, and offered to female Sprague-Dawley rats on the first experimental day. The amount consumed was determined. From the second day on, the rats were fed with unlabeled β- and γ-BHC respectively in the daily diet at the rate of 10 ppm for 10 days. Within ten days, 12.2-13.0% of the radioactivity was excreted in the urine and 5.4-5.8% in the feces in the case of β-BHC; 48.8-52.0% was excreted in the urine and 20.8-22.2% in the feces in the case of γ-BHC. Because the radioactivity was excreted in the feces little by little, it was not possible to determine the exact amount of BHC absorbed from the digestive tract; however, the absorption rate of β-BHC was presumed to be about 95%, and that of γ-BHC was estimated at 85% within five days. In another group of rats adapted by 49-day administration of feed containing 10 ppm γ-BHC, and treated as described before, an acceleration of γ-BHC metabolism was recognized.

74-1719. Ottolenghi, A. D.; Haseman, J. K.; Suggs, F. (Nat. Inst. Environ. Health Sci., Res. Triangle Park, NC 27709). **Teratogenic effects of aldrin, dieldrin, and endrin in hamsters and mice.** *Teratology 9(1): 11-16; 1974.* (22 references)

Aldrin, dieldrin and endrin administered to pregnant hamsters and mice at one half LD50 caused a marked increase in fetal deaths in hamsters, but not mice. In hamsters open eye, webbed foot, and cleft palate were observed with all pesticides and particularly after treatment on day 8 of gestation. Cleft lip was seen most frequently with aldrin and fused ribs with endrin. Open eye and webbed foot were more frequently seen with aldrin in mice and cleft palate was most frequent in

the dieldrin-treated mice. Webbed foot and open eye may have been related to growth retardation.

74-1720. Hunter, B.; Mawdesley-Thomas, L. E.; Worden, A. N. (Huntingdon Res. Cent., Huntingdon PE18 6ES, England). **The administration of maleic hydrazide and its diethanolamine salt to rats.** *Toxicology 1(4): 301-307; 1973.* (12 references)

Maleic hydrazide (MH) and its diethanolamine salt (MH 30) did not produce significant mortality in rats at a dose of 2 mg twice weekly for 65 wk. Small numbers of tumors were only seen in animals receiving MH in water or MH30 in arachis oil or water and there was no elevation of incidence comparable to that of transplantable local sarcomata observed by Dickens and Jones. The local tumors could have been due to repeated stimulation of the skin and thus non-specific. Only two hepatomata were observed, one in a control male and one in a female treated with MH in water. No increase in the occurrence of right inguinal mammary gland tumors resulted from either treatment.

74-1721. Van Logten, M. J.; Wolthuis, M.; Rauws, A. G.; Kroes, R. (Lab. Toxicol., Pharmacol., Pathol., Nat. Inst. Pub. Health, Bilthoven, The Netherlands). **Short-term toxicity study on sodium bromide in rats.** *Toxicology 1(4): 321-327; 1973.* (10 references)

No alteration was observed in the growth rate or mortality of rats after administration of up to 19,200 ppm sodium bromide in their diet for two weeks. At the highest dose the animals did not clean themselves sufficiently and showed signs of motor incoordination of their hind legs. Plasma bromide increased rapidly during the first week, and a plateau was reached by the third week in all treated animals. A dose dependence was evident for bromine levels in plasma and in brain, kidneys, and liver. About 50% of the chloride in plasma, brain, kidneys, and liver was replaced by bromide after treatment at the highest dose. No nephrotoxicity or histopathological changes in brain, liver, and kidneys were seen at the 19,200 ppm dose.

74-1722. George, K. C.; Eapen, J. (Biol. Agr. Div., Bhabha Atomic Res. Cent., Bombay 400 085, India). **In vivo studies on the effect of garlic oil in mice.** *Toxicology 1(4): 337-344; 1973.* (21 references)

Incorporation of ^{14}C-leucine into kidney proteins of mice was markedly reduced by treatment with 5μl of garlic oil which has prospective use as a pesticide. Incorporation into liver proteins was reduced 12% at the 1-hr time point. Incorporation of labeled glucose into the kidneys was not affected by treatment, but a considerable increase in such incorporation in liver glycogen was produced by the garlic oil. Acetate incorporation into lipids was inhibited 19% at 1 hr in liver, but incorporation into kidney lipids was unaffected by treatment. A transient increase in blood glucose and decrease in hepatic glycogen were observed in treated animals, as well as a partial impairment of oxidative phosphorylation associated with the oxidation of ascorbate in hepatic mitochondria.

74-1723. Teleugaliyev, T. M.; Nurzhanov, I. (Alma-Ata Zool. Vet. Inst., Alma-Ata, USSR). **Vetsanekspertiza myasa ryb, otravlennykh khlorofosom. [Veterinary-hygienic examination of the meat of fish poisoned with chlorophos.]** *Vestn. Sel'skokhoz. Nauki Kaz. 8: 109-111; 1973.* (1 reference) (Russian)

A veterinary-hygienic examination was performed on the meat of cyprinid fish kept in water containing 0.1-0.2% trichlorfon. Residues in the meat were determined by photoelectrocolorimetry. The fish died, usually within one day following exposure to trichlorfon. Stagnant plethora of the liver, kidney, and spleen, and hemorrhage of the intestinal mucosa were found on autopsy. The organoleptic properties and the consistency of the meat were normal, while the meat pH value was lower by 0.2 than that measured in control samples, and the ammonia-amine nitrogen content was slightly increased. The branchial peroxidase test was negative in four out of a total of 16 cases. The trichlorfon and DDVP (dichlorvos) residue concentrations in the meat of poisoned fish reached 871 mg/kg.

74-1724. Hass, D. K. (Shell Development Co., Biol. Sci. Res. Cent., Modesto, CA). **Critical evaluation of dichlorvos tablets in puppies.** *Vet. Med. Small Anim. Clin. 68: 900-901; 1973.*

Forty-two puppies (21 beagles, 21 unknown background) between the ages of 33 and 52 days were given compressed tablets containing dichlorvos in doses of approximately 11 mg/kg. A single dose was 97% effective in removing mature worms of the species *T. canis* and *T. leonina* from the suckling puppies. The dichlorvos was effective in removing 91% of the adult *T. canis* and 87% of the adult *T. leonina* populations from the weaned animals. The animals showed no significant side effects from the drug treatment.

74-1725. Shevchenko, A. V.; Koshel', N. N. (Lab. Exp. Pharmacotherapy, Kiev Sci. Res. Inst. Endocrinol. and Metabolism of the Ukr. SSR Ministry of Public Health, Kiev, USSR). **O vliyanii blokatora kory nadpochechnikov *o,p'*-dikhlordifenildikhloretana (*o,p'*-DDD) na protsessy atsetilirovaniya v pecheni. [On the effect of the adrenal cortex blockader *o,p'*-dichlorodiphenyldichloroethane (*o,p'*-DDD) on acetylation processes in the liver.]** *Vrach. Delo 1: 72-74; 1974.* (Russian)

The effect of *o,p'*-DDD (TDE) on the acetylation of paraaminobenzoic acid and on the urinary excretion of paraaminohippuric acid was studied in guinea pigs, rats, and rabbits and in patients with Itsenko-Cushing's

syndrome treated with *o,p'*-DDD. The guinea pigs were administered a single 150 mg/kg dose and daily 150 and 300 mg/kg doses of *o,p'*-DDD for 10 and 28 days, respectively. Rats and rabbits were given daily 300 mg/kg doses for 17 and 28 days. The patients were treated with daily 6-10 g of *o,p'*-DDD for 4-6 weeks. Except for a temporary reduction in the paraaminobenzoic acid acetylation capacity of the liver after administration of a single 150 mg/kg dose of *o,p'*-DDD, no further changes in the hepatic acetylation capacity, and in the paraaminohippuric acid formation were noted. The findings indicate that prolonged administration of *o,p'*-DDD does not damage the hepatic acetylation mechanism.

74-1726. Grzycki, S.; Zarebska, A. (Dept. Histol. Embryol., Med. Fac., Med. Acad., Lublin, Poland). **Histoenzymatic studies on the liver cell after the administration of gamma-benzene hexachloride (lindane).** *Z. Mikrosk.-Anat. Forsch. 87(4): 470-476; 1973.* (11 references)

Lindane (7.5 mg daily) was administered by esophageal tube to fasting male rats daily for 7 or 14 days. The activity of acid phosphatase increased in the liver cells of these animals, especially those treated for 14 days, while the activity of glucose-6-phosphatase was increased slightly only in the animals which received lindane for 7 days. The lindane treatment did not affect the activity of thiamine pyrophosphatase. The glycogen periodic acid-Schiff (PAS) reaction decreased in the cells lying in the center vein zone, but increased in the hepatocytes of the peripheral lobule zone. These results indicate lindane-induced disturbances in the carbohydrate economy of the liver cell, which, as a consequence of the activity of the lytic intra-cell processes, leads to the damaging of the liver parenchyma.

See also **74-1544** **74-1605** **74-1756**

74-1727. Suzuki, K.; Nagayoshi, H.; Kashiwa, T. (Agr. Chem. Inspect. Sta., Minist. Agr. Forest., Kodaira-shi, Tokyo, Japan). **The systematic separation and identification of pesticides in the first division.** *Agr. Biol. Chem. 38(2): 279-285; 1974.* (3 references)

The systematic identification and determination of many kinds of pesticides were tried by a combination of column, thin-layer and gas chromatography. Pesticides in the first division, e.g., aldrin, DMC ethylene (BCPE), CPAS, DDDS, *o,p'*-DDT, *p,p'*-DDT, heptachlor, quintozene, Telodrin (isobenzan), and tetrasul, were separated from pesticides in the second division, e.g., α-BHC, β-BHC, γ-BHC, trifluralin, CPA, CNP, nitrofen, endrin, dieldrin, dicofol, etc. by column chromatography. Further, pesticides in the first division were separated from each other and determined approximately by thin-layer and gas chromatography. The recoveries of these pesticides, except for aldrin and CPAS, were about 100%. The recoveries of aldrin and CPAS were about 70% due to decomposition during the procedures, or to adsorption on the adsorbent during the column chromatogaphy. It was presumed from GC-MS data that CPAS was decomposed to DDDS, tetrasul and other compounds during the procedures. (Author abstract by permission)

74-1728. Soderquist, C. J.; Crosby, D. G.; Bowers, J. B. (Dept. Environ. Toxicol., Univ. California, Davis, CA 95616). **Determination of cacodylic acid (hydroxydimethylarsine oxide) by gas chromatography.** *Anal. Chem. 46(1): 155-157; 1974.* (18 references)

A procedure developed for the determination of cacodylic acid and its salts depends on the conversion of the acid to iododimethylarsine with hydriodic acid. Hydriodic acid was added to the residue from evaporation of water samples or to dried soil samples followed by 5 ml of hexane. The hexane extract of iododimethylarsine was analyzed immediately by tritium electron capture GC. The procedure was rapid, but precautions had to be taken in the handling of iododimethylarsine which is both volatile and poisonous. Limits of detection were 0.05 ppm in water and 0.5 ppm in soil.

74-1729. Eichelberger, J. W.; Harris, L. E.; Budde, W. L.* (Environ. Protection Agency, Nat. Environ. Res. Cent., Anal. Qual. Contr. Lab., Cincinnati, OH 45268). **Analysis of the polychlorinated biphenyl problem. Application of gas chromatography-mass spectrometry with computer controlled repetitive data acquisition from selected specific ions.** *Anal. Chem. 46(2): 227-232; 1974.* (10 references)

Polychlorinated biphenyls (PCBs) were determined in a sediment sample from an Ohio lake by a highly sensitive GC-MS system. The results indicate that the system will be useful in determining PCBs and a number of other contaminants in the environment. The use of subset data acquisition techniques with a mini-computer controlled MS took advantage of information-containing ions generated in the ion source but normally discarded. Data obtained in this manner was used to determine polychlorinated biphenyl mixtures in the presence of DDT, dieldrin, DDE and DDD (TDE).

74-1730. Renberg, L. (Nat. Swedish Environ. Protection Board, Special Anal. Lab., Wallenberg Lab., Lilla Frescati, 104 05 Stockholm 50, Sweden). **Ion exchange technique for the determination of chlorinated phenols and phenoxy acids in organic tissue, soil, and water.** *Anal. Chem. 46(3): 459-461; 1974.* (9 references)

Determination of chlorinated phenols and phenoxy acids was carried out using an ion exchange technique for separation followed by GC analysis. Tissue samples were extracted first with hexane plus acetone and hexane plus diethyl ether, the extract shaken with HCl and evaporated to dryness and the residue taken up in benzene. The benzene extract was shaken with 3 ml of 0.1 *M* NaOH and 3 ml of Sephadex QAE, A-25 anion exchanger. The resin was washed with distilled water and shaken with HCl and 3 ml of benzene. Diazomethane was added to the benzene extract, and after 1 hr the derivatives formed were analyzed by GC. Soil samples were shaken with sodium hydroxide, treated with resin, and analyzed as above. Water samples were run through a column of the resin and analyzed in the same way. Limits of detection for 10-gram tissue or soil samples were 0.1-1 ppb and for 1 liter of water 0.001-0.1 ppb. A level of 1200 ppm pentachlorophenol was found in extractable muscle fat of a dead fish found in a contaminated river.

74-1731. Bhavnagary, H. M.; Ahmed, S. M. (Cent. Food Technol. Inst., Mysore-2 A, India). **A spectrophotometric method for the micro-determination of piperonyl butoxide in the presence of pyrethrins.** *Analyst (London) 98(1172): 792-796; 1973.* (10 references)

A rapid spectrophotometric method has been developed for the microdetermination of piperonyl butoxide in the presence of a wide range of pyrethrins. A solution of the mixture of piperonyl butoxide and pyrethrins in a low-boiling fraction of light petroleum is evaporated on a water-bath until only a small portion of the solvent remains. The final traces of solvent are removed at 50°C and, to the residue containing piperonyl butoxide and pyrethrins, 18 per cent m/V nitric acid is added in order to convert the piperonyl butoxide content into a soluble yellow-colored compound. The quantitative color reaction has a maximum absorption at 370 nm, and the method is applicable to the residues in the range 4 to 40 $\mu g\ ml^{-1}$ of piperonyl butoxide. The method is also applicable to the residues of formulated products extracted from grains and paper coatings. (Author abstract by permission)

74-1732. Rajzman, A. (Div. Fruit and Veg. Storage, Agr. Res. Org., The Volcani Center, Bet Dagan, Israel). **Determination of thiabendazole in citrus fruits by ultraviolet spectrophotometry.** *Analyst (London) 99(1175): 120-127; 1974.* (8 references)

A method for the ultraviolet spectrophotometric determination of thiabendazole in citrus fruit is described. It is extracted from the fruits by equilibrating the mashed peels or pulps with chloroform, the extract is acidified and the mixture concentrated in order to eliminate the chloroform and filtered. After making the filtrate slightly alkaline the thiabendazole is re-extracted with chloroform and determined by measuring the absorption of the extract at 302 to 303 nm. The procedure enables the satisfactory elimination of interfering substances to be achieved, and small amounts of thiabendazole of the order of 0.1 ppm in the peel and the pulps and 0.03 ppm in the whole fruit to be determined. The recovery of thiabendazole added to the peel or pulp of fruit varies between 94.1 and 103.0 per cent. (Author abstract by permission, abridged)

74-1733. Maes, R.; Drost, R. H.; Sauer, H. (Lab. Toxicol. Biotransformation, State Univ. Utrecht, The Netherlands). **GLC determination of Ekalux residues in various crops.** *Bull. Environ. Contam. Toxicol. 11(2): 121-128; 1974.* (3 references)

Fruit and vegetables were treated with aqueous spray emulsions containing 0.2% of the organophosphorus insecticide Ekalux (quinalphos). The samples were blended with ethylacetate and anhydrous sodium sulfate, vacuum filtered, evaporated, and dissolved in ethylacetate. The dissolved extract was distilled in a sweep co-distillation apparatus and dissolved in ethylacetate before being injected into a gas chromatograph. In samples containing 0.1 ppm Ekalux, 80 to 85% of the chemical was recovered, while in samples containing 1 ppm Ekalux, 85 to 90% was recovered. The P = O metabolite was recovered at a rate of 70 to 80% at the 0.1 ppm level and at a rate of 80 to 85% at the 1 ppm level. There were no significant peaks interfering with those of the Ekalux residues. As little as 0.002 ppm Ekalux or its P = O metabolite was detectable. The results were reproducible, and the response was linear up to 10 ng-μl^{-1}. Ekalux dissipated quickly from treated crops and the P = O metabolite was rarely detectable. No other P containing metabolites were found.

74-1734. Peters, J. A.; Baxter, K. J. (Forest Range Exp. Station, Protection Forestry Div., Forest Service, Rangiora, New Zealand). **Analytical determination of compound 1080 (sodium fluoroacetate) residues in biological materials.** *Bull. Environ. Contam. Toxicol. 11(2): 177-183; 1974.* (12 references)

A rapid and accurate method is described for the determination of toxic organofluorine residues in biological samples. A suitable aliquot of liquid sample material is adsorbed onto filter paper, briefly dried, and transferred to the platinum basket of an oxygen combustion flask. The sample is degraded by oxygen combustion, and the liberated inorganic fluoride is determined using an ion-specific electrode. Inorganic fluoride is determined in the extracted sample by omission of the combustion stage. The method is specifically designed for the determination of sodium fluoroacetate and several of its derivatives with similar physiological actions during vertebrate pest-control programs.

74-1735. Dietz, A. A.; Rubinstein, H. M.; Lubrano, T. (Res. Med. Serv., VA Hosp., Hines, IL 60141). **Colorimetric determination of serum cholinesterase and its genetic variants by the propionylthiocholinedithiobis-(nitrobenzoic acid) procedure.** *Clin. Chem. 19(11): 1309-1311; 1973.* (8 references)

A simple and sensitive method for the determination of serum ChE and its genetic variants utilized the hydrolysis of propionylthiocholine to free sulfhydryl which reacts with 5,5-dithiobis-(2-nitrobenzoic acid) (DTNB) to yield 5-thio-2-nitrobenzoate ion. Substrate or substrate plus dibucaine inhibitor were added to pH 7.6 buffer-DTNB at 37° along with dilute serum. After 3 min. 1 ml of quinidine reagent was added and the absorbance was recorded at 410 nm. The method can be automated if RO2-0683 is substituted for dibucaine when genetic variants are studied.

74-1736. Kroeller, E. (Max von Pettenkoffer-Institut, Bundesgesundheitsamt, Berlin-Dahlem, Germany). **Eine neue kolorimetrische Methode zur Restmengenbestimmung von Pentachlornitrobenzol. [A new colorimetric method for residue analysis of pentachloronitrobenzene.]** *Deut. Lebensm.-Rundsch. 70(2): 69-71; 1974.* (5 references) (German)

A simple and reliable method is described for the extraction and colorimetric determination of pentachloronitrobenzene in plant materials. Pentachloronitrobenzene is extracted from crushed plant materials by methylene chloride and purified by repeated distillation following addition of titanium trichloride, sulfuric acid, and sodium sulfate. The dry residue is dissolved in carbon tetrachloride and applied on silica gel layer for visualization in UV light, using heptane as solvent. The pentachloroaniline, reduced in this manner from pentachloronitrobenzene, appears as an oval spot of blue fluorescence, the *Rf* value being 0.2. Pentachloroaniline is then scraped off, combined with acetic acid, and diazotized by means of hydrochloric acid, diazotizing solution, sulfamic acid, and naphthylethylene diamine for dye formation. The red-colored solution is then measured in a spectrophotometer at 490 nm. The sensitivity amounts to 0.05 ppm in 2 cm-cuvette and to 0.02 ppm in 5 cm-cuvette. The recovery rate, determined during the analysis of cabbage and bananas for pentachloronitrobenzene residues, is 95% for cabbage and 78% for bananas.

74-1737. Wozniak, J.; Tokarz, A. (Inst. Biopharmacy, Medical Academy, Warsaw, Poland). **Niektore aspekty chromatografii gazowej w oznaczaniu pestycydow w materiale biologicznym. cz.I. [Some aspects of gas chromatography in the determination of pesticides in biological material. Part I.]** *Farm. Pol. 29(6): 511-516; 1973.* (20 references) (Polish)

The fundamentals of gas chromatography and its application as a means of detection for pesticide residues are briefly discussed. The importance of choosing the correct type of column, stationary phase, and carrier is stressed. The best separation of organochlorine pesticides is obtained when glass beads coated with methylsilicone are used; the best separation of organophosphates is achieved in columns filled with teflon beads or Chromosorb Q. The structure and operation of thermionic and electron capture detectors is described. The first differs from a flame ionization detector by the presence of an anode surrounding ring of pressed CsBr which increases sensitivity to organophosphorus pesticides. By regulating the flow of hydrogen, air, and nitrogen, this detector can be selectively sensitized to organophosphate or organochlorine compounds. The electron capture detector makes use of a cathode which makes contact with a plate containing a source of radioactivity (Ni^{63}, H^3, Sr^{90}). The carrier gas (argon + methane) is ionized giving off NH_4^+ ions. Organochlorine pesticides present in the carrier gas capture electrons from the area between the electrodes, become negatively charged, and immediately recombine with the positively charged NH_4^+. The resulting decrease in current is proportional to the concentration of the pesticide.

74-1738. Schulte, E.; Acker, L. (Inst. fuer Lebensmittelchemie, Univ. Muenster, Muenster, Germany). **Gas-Chromatographie mit Glaskapillaren bei Temperaturen bis zu 320°C und ihre Anwendung zur Trennung von Polychlorbiphenylen. [Gas chromatography with glass capillaries at temperatures up to 320° C and its application for separation of polychlorinated biphenyls.]** *Fresenius' Z. Anal. Chem. 268(4): 260-267; 1974.* (16 references) (German)

A gas chromatograph with glass capillary columns can be used for the separation of PCBs from biological extracts. The inside of the glass capillaries is coated with a very thin, solid layer of benzyltriphenyl phosphonium chloride. Even minor components and metabolites can be separated and detected. The determination of organochlorine pesticide residues is also possible without fractionation by thin-layer chromatography or column chromatography before gas-chromatographic analysis. Using application of splitless injection, errors caused by the usual splitting at the injector can be avoided.

74-1739. Gilbert, D. D.; Mann, J. M. (Chem. Dept., Northern Arizona Univ., Flagstaff, AZ). **Herbicide analysis by pulse polarography–picloram.** *Int. J. Environ. Anal. Chem. 2: 221-228; 1973.* (19 references)

A pulse polarographic method for the determination of picloram in water is described. The method is four to five times more sensitive than other reported polarographic methods and is more rapid than the conventional bioassay or chromatogaphic techniques. As little as 0.02 ppm picloram can be detected by pulse polarography, which is about 10 times more sensitive than colorimetric analysis and can be conducted in a normally lighted laboratory. A buffer solution of 0.01 *M* sodium acetate-0.026 *M* acetic acid was used to evaluate the analysis of a natural water system. Errors range from 3-8% (relative) in the 0.05-0.20 ppm picloram range, with precisions of +5% (relative) or better. Interferences with 0.1 ppm picloram from 100 ppm Cr(IV) and Zn(II) are severe; neither ion interferes at 1 ppm. Fe(III) interference can be eliminated by masking with EDTA. Mn(II), Cu(II), and Pb(II) do not interfere at 10 ppm. The analysis can be expected to be applicable to a variety of other herbicides, including paraquat, diquat, morfamquat, and barban. However, the pH of the solution should be adjusted according to the p*Ka* values for each herbicide to yield maximum sensitivity for that herbicide.

74-1740. Thornton, J. S.; Drager, G. (Chemagro Div., Baychem Corp., Kansas City, MO). **Determination of residues of mesurol and its toxic metabolites in plant and animal tissues.** *Int. J. Environ. Anal. Chem. 2: 229-239; 1973.* (19 references)

A specific gas chromatographic procedure was used for the determination of residues of mesurol (methiocarb) and its sulfoxide and sulfone metabolites in plant and animal tissues. Following initial extraction and precipitation, the extract was oxidized with potassium permanganate to convert the mesurol and its sulfoxide to the sulfone. The sulfur-specific flame photometric detector was used for the final detection of sulfone, thus allowing little interference from tissue coextractives. Known amounts of mesurol and metabolites were added at the blending step to various crop samples, animal tissues, and milk. Recovery data from these samples was generally in the 70 to 120% range. The method was sensitive to the 0.03 ppm level.

74-1741. Ali, K. H.; Wheelock, J. V. (Min. Agr., Khartoum, Sudan). **Pesticides in effluents and polluted river water.** *Int. J. Environ. Anal. Chem. 2(4): 261-272; 1973.* (30 references)

Simultaneous analysis of pesticides in samples from the heavily polluted River Aire and effluent from a wool-scouring mill and a sewage treatment plant was accomplished through a combination of techniques. Acidified water samples were extracted with hexane, partitioned with DMF, chromatographed on alumina (except when malathion was known to be present), and analyzed by TLC on silica gel G or GC or by a combina-

tion of both. Recoveries from river water were generally > 85%. Dieldrin, α-BHC and γ-BHC were found in most samples taken from below the treatment plant and in effluent from the sewage plant and the wool-scouring mill. Sewage effluent, which contained the effluent from the mill, had higher levels (0.1 to 3.8 ppb) of individual organochlorines than river water (0.022 to 1.2 ppb). Negligible amounts were found above the sewage outfall. Occasionally, DDT, DDE, and malathion were also found in the river water and effluent.

74-1742. Storherr, R. W. (Registration Div., Environ. Protect. Agency, Washington, DC 20205). **Report on carbamate pesticides, fumigants, and miscellaneous.** *J. Ass. Offic. Anal. Chem. 57(2): 296; 1974.*

Associate referees in this group have been working on methods for determining carbamate derivatives and sodium monofluoroacetate. Further studies are needed on ethylene oxide and its chlorohydrin, fumigants, nicotine, and phostoxin. Collaborative studies are to be initiated on the application of the carbamate test method to methyl carbamates and on fumigants in grain. Additional study of the method for cyanides in fatty foods is advised. In addition to further study of the official first action method for piperonyl butoxide, application of this method to milled grains requires investigation. (General referee reports presented at the 87th Annual Meeting of the Association of Official Analytical Chemists, Washington, DC, Oct. 9-12, 1973.)

74-1743. Burke, J. A. (Div. of Chem. and Phys., Food and Drug Admin., Washington, DC 20204). **Report on chlorinated pesticides.** *J. Ass. Offic. Anal. Chem. 57(2): 296-298; 1974.*

Associate Referee reports in the area of chlorinated pesticides included studies on chlordane degradation in an estuarine system and a recommendation for further study. Modifications of the basic multiresidue technology are being sought to permit determination of the chlorinated acaricides, heptachlor, and heptachlor epoxide. Recovery data for hexachlorobenzene was compiled using the multiresidue method. A procedure was developed which gives complete recovery of hexachlorobenzene from fats and oils, avoiding the losses encountered in petroleum ether-acetonitrile partitioning. The extraction, cleanup, and gas-liquid chromatographic determination of mirex in fish and fat were examined. Recoveries through the partitioning average 77%. Because of a long GLC retention time the effective sensitivity is not sufficient for some analyses. The analytical behavior of mirex and hexachlorobenzene is similar, and therefore it seems advisable that the Associate Referees for these two compounds work together. Collaborative studies were conducted on a method for organochlorine pesticides in soils. The method utilizes a hexane-acetonene (1+1) extraction of soil premoistened with 0.2 *M* ammonium chloride in connection with multiresidue cleanup and determinative methodology.

74-1744. Yip, G. (Div. Chem. Technol., Food and Drug Admin., Washington, DC 20204). **Report on fungicides, herbicides, and plant growth regulators.** *J. Ass. Offic. Anal. Chem. 57(2): 299; 1974.*

A collaborative study on diquat and paraquat is underway in potatoes, oranges, soybeans, and sugar cane. Samples are initially digested with 18 *N* sulfuric acid. Cleanup is accomplished by adsorption of the herbicides onto a cation exchange column. After desorption the herbicides are reduced with sodium dithionite, forming a free radical with an intense color, which is then read spectrophotometrically. Several modifications have been made to the method for determining maleic hydrazide. The sample is digested with hydrochloric acid, then neutralized, and volatile materials driven off under alkaline conditions. Maleic hydrazide is reduced to hydrazine which is distilled into an acid solution. A cleanup with charcoal has been added. Further studies are proposed in several areas.

74-1745. Corneliussen, P. E. (Div. Chem. Technol., Food and Drug Admin., Washington, DC 20204). **Report on multiresidue methods (interlaboratory studies).** *J. Ass. Offic. Anal. Chem. 57(2): 301-303; 1974.*

Collaborative or interlaboratory studies were conducted and/or planned on various aspects of multiresidue methods for nonfat foods, gas chromatography/alkaline precolumn, heavy metals, multimetal residues by resin column separations, multiple chlorinated and phosphated pesticides, multiple (chlorinated) pesticide residues in soil, organophosphorus pesticide residues, pesticides in meat and meat products, polychlorinated biphenyls, total diet samples, and whole blood. Since PCBs are recovered in less than quantitative yields when the petroleum ether-acetonitrile partitioning step is used, new methodology which eliminates this step was investigated.

74-1746. McCully, K. A. (Health Protection Branch, Dept. Nat. Health Welfare, Ottawa, Ontario, Canada K1A 1B7). **Report on phosphated pesticides.** *J. Ass. Offic. Anal. Chem. 57(2): 303-307; 1974.* (40 references)

Reports on methodology for organophosphorus pesticide residues appearing since the last AOAC meeting are reviewed. Specific separation procedures for residues in various foods are under development. The sweep codistillation cleanup technique has been used in methods for determination of chlorpyrifos, chlorfenvinphos, ethion, and thionazin. Recoveries ranged from 66% to 112% using an automated procedure based on this principle on 27 pesticides in 13 crops. Cleanup procedures recently reported used Florisil columns, gel

filtration and low-temperature extraction and precipitation. On-column esterification methods have been developed for screening and confirmation. Studies are continuing on improving the quantitative accuracy of thin-layer chromatographic techniques.

74-1747. Jung, P. D.; Clarke, D. (Div. of Inspection and Regulation, Maryland Dept. of Agr., College Park, MD 20742). **Atomic absorption spectroscopic determination of cadmium in fungicide formulations.** *J. Ass. Offic. Anal. Chem. 57(2): 379-381; 1974.* (3 references)

A rapid and accurate method for the determination of cadmium in fungicidal materials using the secondary absorption at 326.1 nm has been developed. Analyses of several fungicide formulations containing cadmium, as well as synthetically prepared samples, are reported and discussed. The range of recovery of cadmium from synthetic samples was 100-105%. (Author abstract by permission)

74-1748. Allen, J. L.; Sills, J. B. (Fish Control Lab., Fish and Wildl. Serv., Dept. Interior, La Crosse, WI 54601). **Gas-liquid chromatographic determination of 3-trifluoromethyl-4-nitrophenol residues in fish.** *J. Ass. Offic. Anal. Chem. 57(2): 387-388; 1974.* (8 references)

A procedure for the determination of 3-trifluoromethyl-4-nitrophenol (TFM) in fish tissues is described. Homogenized tissues are extracted with hexane-ethyl ether; the extract is cleaned up by partitioning the TFM from the extracting solvent into 0.1*N* NaOH, acidifying the aqueous solution, and partitioning again with hexane-ethyl ether. The TFM is methylated with diazomethane and analyzed by gas-liquid chromatography, using electron capture detection. Recoveries ranged from 75 to 100% from fish muscles that were spiked with 0.01-2.00 μg TFM/g. (Author abstract by permission)

74-1749. Chau, A. S. Y.; Coburn, J. A. (Special Services Section, Water Qual. Branch, Canada Cent. Inland Waters, Burlington, Ontario, Canada L7R 4A5). **Determination of pentachlorophenol in natural and waste waters.** *J. Ass. Offic. Anal. Chem. 57(2): 389-393; 1974.* (11 references)

A sensitive and reliable method suitable for routine determination of pentachlorophenol (PCP) in natural and waste waters is reported. PCP is extracted from the preserved sample with benzene and from the benzene into a potassium carbonate solution. The addition of acetic anhydride to the aqueous solution produces the acetate derivative of PCP which is extracted in hexane and analyzed by electron capture gas-liquid chromatography. The analysis of PCP in lake water and sewage effluent is presented, along with the retention times of 17 other phenolic acetates. By this procedure, as little as 0.01 ppb PCP in 1 l. water can be determined. (Author abstract by permission)

74-1750. Chau, A. S. Y.; Terry, K. (Water Quality Branch, Canada Cent. for Inland Waters, Burlington, Ontario, Canada L7R 4A6). **Confirmation of pesticide residue identity. VI. Derivative formation in solid matrix for confirmation of heptachlor and endosulfan isomers.** *J. Ass. Offic. Anal. Chem. 57(2): 394-398; 1974.* (16 references)

An alternative method for the confirmation of heptachlor residue identity is described. This method entails derivation in a solid matrix prepared from alumina and sulfuric acid to obtain a single derivative in almost quantitative yield. (Author abstract by permission)

74-1751. Claeys, R. R.; Inman, R. D. (Dept. Agr. Chem., Oregon State Univ., Corvallis, OR 97331). **Adsorption chromatographic separation of chlorinated hydrocarbons from lipids.** *J. Ass. Offic. Anal. Chem. 57(2): 399-404; 1974.* (17 references)

Florisil, alumina, and silicic acid were compared for the column chromatographic separation of lipids from chlorinated hydrocarbons. Alumina had the largest capacity per unit volume to retain lipids and oils (0.7 g beef lipid/25 g alumina) while eluting dieldrin. Florisil had a larger capacity than silicic acid. Deactivation and elution with a nonpolar solvent gave superior separation over previously used polar solvent elution from activated adsorbents. The effects of temperature, water, and lipid load on the elution of dieldrin were studied. A yellow dye, *p*-methoxyazobenzene, was found to have a slightly larger elution volume than dieldrin, and is useful as a visible reference material for the elution of chlorinated hydrocarbons. (Author abstract by permission)

74-1752. Stahr, H. M.; Buck, W. B.; Ross, P. F. (Chem. Sect., Veterinary Diagnostic Laboratory, Iowa State Univ., Ames, IA 50010). **Gas-liquid chromatographic determination of sodium fluoroacetate.** *J. Ass. Offic. Anal. Chem. 57(2): 405-407; 1974.* (3 references)

Sodium fluoroacetate is extracted from biological samples, esterified, and determined by GLC, using a Resoflex column. The identity of the rodenticide is confirmed by a fluoride electrode procedure or by GLC/MS. The method can detect as low as 0.1 μg sodium fluoroacetate. (Author abstract by permission)

74-1753. Bonini, M.; Saux, M. C.; Larcebau, S.; Castagnou, P. (Lab. de Toxicol. et d'Hygiene Appl., Bordeaux, France). **Dosage du paraquat dans les milieux biologiques. [Determination of paraquat in biological**

media.] *J. Eur. Toxicol. 6(4): 237-239; 1973.* (4 references) (French)

A colorimetric method is described for the determination of paraquat in biological media, such as blood and urine. Blood samples are purified by the addition of distilled water and 20% trichloracetic acid; the proteins are precipitated and the pH value is adjusted to 5.5-6 by the addition of sodium hydroxide. Further purification is done by means of ion exchange resin, after which the purified sample is reduced by means of sodium dithionite in alkaline medium to obtain a blue colored monohydrodipyridyl with an absorption peak at 630 microns. Urine samples can be directly combined with sodium dithionite for determination; dilution may be necessary in certain cases.

74-1754. Zimmerli, B. (Abt. Lebensmittelkontrolle, Sektion Pestizidrueckstaende und Kontaminationen, Eidgenoessisches Gesundheitsamt, Bern, Switzerland). **Erfahrungen bei der Konzentrierung pestizidhaltiger Extrakte. (Petrolaetherloesungen chlorierter Pestizide im Konzentrationsbereich von Picogrammen pro ml). [Experiences in the concentration of pesticide-containing extracts. Petroleum ether solutions in the concentration range of picograms per ml.]** *Mitt. Geb. Lebensmittelunters. Hyg. 64(4): 528-533; 1973.* (5 references) (German)

A method for the concentration of petroleum ether extracts of organochlorine pesticides in concentrations of 25 pg/ml and upward is described. The petroleum ether extract to be concentrated is combined with *n*-heptane to obtain a specific volume, after which the solution is heated at 65 C, and high-purity nitrogen is blown in through a thin tube made of glass or steel. The volume of the concentrated extract is then adjusted to 50 microliter by the addition of *n*-heptane. The rates of recovery, determined for hexachlorobenzene, alpha-BHC, beta-BHC, lindane, heptachlor epoxide, *p,p'*-DDE, *p,p'*-DDD (TDE), and *p,p'*-DDT are 83.1-87.9%, 81.9-89.7%, 81.7-91.6%, 82.5-92.1%, 80.6-94.3%, 81-97.7%, 82-96.6%, and 92.9-100.3%. The standard deviation of the whole procedure (concentration and gas-liquid chromatographic analysis) was between 4 and 8%, depending on the pesticide.

74-1755. Pestemer, W.; Haensch, R.; Sadowski, J. (Inst. fuer Unkrautforschung, Biol. Bundesanstalt, Braunschweig, Germany). **Extraktion, Clean-up und gaschromatographische Bestimmung von Medinoterb-acetat in sorptionsstarken Boeden und Zuckerrueben. [Extraction, clean-up and gas-chromatographic determination of Medinoterb-acetate in strongly sorptive soils and sugar beets.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 26(2): 20-22; 1974.* (17 references) (German)

A method for the extraction, clean-up, and gas-chromatographic determination of medinoterbacetate (2,5-dinitro-3-methyl-5-*tert*-butylphenylacetate) in highly sorptive soils and in leaves and roots of sugar beets is described. Following extraction from homogenized samples by means of toluene and hexane in a ratio of 1:9, the extract is cleaned up on an alumina-filled column where hydrolysis to a dinitrophenol also takes place. The dinitrophenol is eluted with 1*N*-sodium hydroxide and subsequently methylated by means of diazomethane solution. Gas-chromatographic determination is done with nitrogen as carrier gas at an injection temperature of 220 C, a column furnace temperature of 165 C, and using tritium as detector. The limit of sensitivity is 0.01 ppm for a sample weight of 100 g. The recovery rate amounts to 80-100%. The hydrolysate was identified as 2,4-dinitro-3-methyl-5-*tert*-butylphenol by UV spectroscopy. The method is suitable for serial analyses and also for the determination of other dinitrophenol type herbicides.

74-1756. Tomita, M.; Someya, N.; Nishimura, M. (School of Hyg., Tokyo Dental College, Tokyo, Japan). **[Quantitative determination of organophosphorus pesticides in blood.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 214; 1974.* (Japanese)

Collected blood (2-5 ml) was hemolyzed by adding 10 ml of distilled water and extracted three times with ethyl acetate. The extract was centrifuged for 5 min. at 3000 rpm. About 50 ml of the ethyl acetate layer was concentrated at 35°C under reduced pressure to yield a solid; the solid, after dissolving in 0.2 ml of acetone, was gas chromatographed with columns such as DC-200+QF-1, OV-17, and DEGS. The recovery of fenitrothion (0.4 micrograms added to 2 ml of blood) was about 95%. The blood of beagles given fenitrothion for a long time contained fenitrothion at 0.001 μg/ml. The erythrocyte ChE had dropped to 20% of the control value. Acetone, an acetone extract of filter paper, and sodium sulfate showed very distinct GC peaks; and the ethyl acetate peak was the smallest suitable for determination. The blood of persons who had never been exposed to organophosphorus pesticides showed a common peak which coincided with the impurity in the solvents, but was about 2-3 times higher. It would be dangerous to identify a GC peak on only one column as a pesticide. The retention times and the detection threshold of dichlorvos, trichlorfon, Salithion, Cyanox, fenitrothion, parathion, dimethoate, and fenitroxon found on three column materials are given. Desmethyl-fenitrothion and 3-methyl-4-nitrophenol gave no peak.

74-1757. Sakama, H.; Someya, N.; Nishimura, M. (School of Hyg., Tokyo Dental College, Tokyo, Japan). **[Studies on the methods of determining cholinesterase activity, Part I. Comparison of DTNB method and ΔpH method.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 29(1): 215; 1974.* (Japanese)

The rapid microdetermination of ChE by Ellman and Voss was studied, and the results were compared with those obtained by the method of Michel and Ueda. In the whole blood ChE activity determination 10 ml of liquid A (10 mg of DTNB plus 50 ml of 0.9% NaCl aq. plus 50 ml Sorensen phosphate buffer) was added to blood, and to 4 ml of the mixture 1 ml of liquid B (75 mg of acetylthiocholine in 50 ml of distilled water) was added. After adding two drops of liquid C (50 mg of eserine in 50 ml of distilled water), the mixture was centrifuged for 5 min. at 3000 rpm, and the supernatant was read colorimetrically at 420 nm. In the plasma ChE activity estimation the centrifugation was carried out just after adding liquid A to whole blood. In both methods the ChE activity was expressed as micromoles SH/10 min./ml following the calibration curve made with reduced glutathione. The results showed that the simultaneous determination of erythrocyte and serum ChE activity gave erroneous values, while the serum separation technique gave a consistent value. The ChE activity obtained by the ΔpH method was closely correlated with that obtained by the DTNB method in the blood of mice given fenitrothion and dichlorvos. The same high correlation was also found for ChE activity in human plasma.

74-1758. Masud, Z.; Nasim, A. I. (Toxicol. Pesticides Lab., Dept. Plant Protection, Karachi, Pakistan). **Gas chromatographic determination of organophosphorus pesticides in formulations.** *Pak. J. Sci. Ind. Res. 15(6): 391-392; 1972.* (4 references)

A rapid, sensitive, and reproducible gas-liquid chromatographic method was developed for the routine analysis of six organophosphorus pesticides (chlorfenvinfos, diazinon, fenitrothion, tetrachlorvinfos, malathion, and phorate) in granular and emulsifiable concentrate formulations. The method makes use of the electron capture detection system, with QF-1 being used as the liquid stationary phase in the GLC column. The limit of detection provided is in the range of 0.01 to 0.14 μg. The method is useful for the determination of tested insecticides in nanogram quantities and may also be applied to the routine analysis of several other organophosphorus pesticides of related structures.

74-1759. Gunchev, Kh.; Dimchev, T. (Institute for Plant Protection, Kostinbrod, Bulgaria). **Neutronnoaktivatsionen analiz na ostat"chni kontsentratsii ot lindan i DDT v pochveni probi. [Neutron-activation analysis of lindane and DDT residue concentrations in soil samples.]** *Pochvozn. Agrokhim. 8(1): 77-86; 1973.* (4 references) (Bulgarian)

A method for the determination of DDT and lindane residue concentrations in soil samples by neutron activation analysis is described; results of actual residue determinations in soil samples from lindane- and DDT-treated fields are presented. The organic content of the samples was extracted with diethyl ether, after which the extract was washed with distilled water. The neutron activation analysis was done by the measurement of two peaks of the total absorption of ^{38}Cl, corresponding to an energy of 2.16 MeV. Measurements of lindane and DDT residue concentrations in soil samples taken from lindane- and DDT-treated patches and in samples taken from non-treated adjacent patches gave results in the same order of magnitude for all samples, indicating general contamination. The lindane and DDT concentrations measured ranged from 8.7 to 71.2 μg/g of soil.

74-1760. Egyed, M. N.; Shlosberg, A. (Kimron Vet. Inst., Bet Dagan, Israel). **Diagnosis of field cases of sodium fluoroacetate and fluoroacetamide poisoning in animals.** *Refuah Vet. 30(3-4): 112-115; 1973.* (15 references)

A combined biological-biochemical method was used in the diagnosis of 143 cases of suspected fluoroacetate (FAC) and fluoroacetamide (FAA) poisoning among cattle, sheep, goats, dogs, cats, pigs, mules, foxes, mink, and bait. The method involved the injection of an aqueous extract of heart and kidney from suspected cases of poisoning into guinea pigs. The kidneys of the guinea pigs were subsequently examined for citrate levels, which are elevated in the presence of FAC and FAA. Of the 143 cases, the guinea pig kidney citrate levels were normal in 63 cases and elevated in the remaining 80 cases. The highest citrate values were obtained after the injection of the suspect baits. The elevated citrate levels were considered indicative of FAC or FAA poisoning.

74-1761. Mukherjee, G.; Muhkerjee, A. K.; Mathew, T. V. (Central Food Lab., Calcutta, India). **Estimation of Sevin by thin layer chromatography.** *Res. Ind. 17(4): 147-148; 1972.* (6 references)

A method is described for the estimation of Sevin (carbaryl). The Sevin is hydrolyzed, and the 1-naphthol liberated is isolated by thin layer chromatography on silica gel G adsorbent sprayed with diazotized benzidine. The pink colored spots formed are then eluted and measured in a colorimeter. The method is simple, accurate, and free from any interference due to the presence of foreign materials. It is highly sensitive, enabling the estimation of Sevin present in amounts as small as 5 μg. This method can be used to estimate Sevin residues in agricultural commodities.

74-1762. Lakshminarayana, V.; Govinda Rao, S. (Central Plant Protection Training Inst., Hyderabad, India). **Determination of parathion and malathion in emulsion concentrates and dusting powder formulations using chloramine-T.** *Res. Ind. 18(3): 98-100; 1973.* (14 references)

A detailed procedure for the determination of parathion and malathion in emulsion concentrate and dusting powder formulations is described. With parathion emulsion concentrate formulations, the emulsifying agent can be separated by dissolving the formulation in hexane. The hexane solution of the parathion emulsion concentrate is then washed with a chilled solution of 2% sodium carbonate to remove any free nitrophenol that may be present. It is then oxidized with excess chloramine-T in an acid medium. The excess chloramine-T remaining after the reaction is estimated iodometrically. In the case of dusting powder formulations, the parathion is extracted in a suitable solvent and then determined as above. This method is rapid and gives results comparable to those obtained by other procedures, acceptable for the routine checking of the quality of malathion and parathion formulations.

74-1763. Das, K. G.; Thayumanavan, B.; Vachha, S. M.; Natu, L. K. (Nat. Chem. Lab., Poona, India). **Determination of malathion residues in wheat grains by gas chromatography and mass spectrometry.** *Res. Ind. 18(3): 100-101; 1973.* (11 references)

A rapid gas chromatographic method using an alkali flame ionization detector has been developed for the quantitative determination of malathion residues in wheat grains. Analysis is carried out using a mass spectrometric technique based on the ion current integration principle. This technique is relatively unaffected by the presence of co-extractives, obviating the necessity for elaborate clean-up procedures. The efficiency of malathion recovery from spiked grain samples ranged from 94 to 99%. The gas chromatograph can detect one nanogram of standard malathion, while the mass spectrometer can estimate quantitatively in the range of 10^{-12} g. The ion current integration method was used to analyze wheat samples from the market. The residue level varied from 0.1 to 0.7 ppm.

74-1764. Takeda, M.; Sekita, H.; Otsuki, K.; Takamatsu, C.; Tanabe, H. (Nat. Inst. of Hyg. Sci., Min. Health and Welfare, Tokyo, Japan). **[Studies on analysis of pesticide residues in foods, Part 10. Analytical method for residues of carbaryl in agricultural products.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(5): 467-473; 1973.* (6 references) (Japanese)

The method of detecting and determining carbaryl residues in powdered rice, a kind of seasoning greens, garland chrysanthemum, and cauliflower was investigated, based on the AOAC method and the method issued by the Japan Ministry of Agriculture and Forestry in 1971. The AOAC cleanup method was inadequate for removing colored materials in the sample when the pigment content was high, and it was further necessary to treat with an activated charcoal column. A cleanup method using two-step column chromatography with alumina and activated charcoal seemed to be complicated, but it was found simpler in the routine procedure handling many specimens. The purified extract was reacted with *p*-nitrobenzene-diazonium fluoroborate in acetic acid. The color developed is less stable than that developed under alkaline conditions, but is sufficiently stable for 20 minutes after the reaction, and no interference was caused by eight other *N*-methyl carbamate insecticides used in Japan. The recovery rate of added carbaryl was 91-96.5%, and the detection limit of the method is 0.01 ppm for a sample size of 100 g.

74-1765. Nakamura, K.; Matsuoka, M.; Kaneda, Y. (Osaka Branch, Nat. Inst. of Hyg. Sci., Min. of Health and Welfare, Osaka, Japan). **[Gas chromatographic analysis of pesticide residues in foods, Part 2. Screening method for organochlorine pesticide residues in aromatic vegetables.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(5): 474-477; 1973.* (6 references) (Japanese)

The natural substances contained in aromatic vegetables such as garland chrysanthemum, parsley, and onion are thought to be essential oils, and they are known to interfere with gas chromatographic analysis of organochlorine pesticide residues in these vegetables. These natural substances could be removed from the extracts of the vegetables by column chromatography on silica gel (100 mesh) which had been washed for 6 hrs with purified ethyl ether in a Soxhlet extractor and dried for two hrs at 110°C. After removal of natural substances by column chromatography, the recovery of added organochlorine pesticide in fragrant vegetables was satisfactory with some exceptions. The low recovery of β-BHC added to onion might be due to partial adsorption of β-BHC on silica gel. The natural substances contained on onion and Welsh onion seemed not to be completely removed by the silica gel.

74-1766. Nakamura, K.; Nakahara, H.; Kaneda, Y. (Osaka Branch, Nat. Inst. of Hyg. Sci., Osaka, Japan). **[Gas chromatographic analysis of pesticide residues in foods, Part 3. Analysis of residual malathion in wheat by GC and GC-MS.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(5): 478-481; 1973.* (9 references) (Japanese)

In a trial of determining malathion residues in wheat, a small amount (about 3%) of the lipids contained in wheat remained and hindered the analysis. Dual column chromatography using 0.5 g of activated charcoal (acid washed) as upper layer and 3 g of silica gel (washed with ethyl acetate for six hrs) as lower layer removed 99% of the lipids, and the recovery of fortified malathion was 99.0%. Using this principle the recovery of malathion in four kinds of wheat specimens was 103, 106, 107, and 118%. In a trial of identifying the pesticide residues by GC-MS the cleaned-up extract obtained

by the above method had to be further purified by TLC on silica gel, developing with benzene or toluene. A distinct TLC was obtained with a malathion spot near *Rf* 0.2 using bromcresol green-silver nitrate reagent. The substance corresponding to the spot gave a peak at a relative retention time of 2.20 in a gas chromatogram. The substance corresponding to RRT 2.20 on the gas chromatogram gave three MS peaks at M/e 173, M/e 127 and M/e 99. The first is presumably the ester moiety, the second the ester after removal of alcohol, and the third after removal of a molecule of CO from the second peak substance. The parent peak of malathion was not obtained under these conditions.

74-1767. Takagi, Y.; Tanida, K. (Fukui Prefect. Pub. Health Res. Lab., Fukui, Japan). **[Pretreatment for photometric determination of carbaryl in unpolished rice.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(5): 482-485; 1973.* (5 references) (Japanese)

Some problems found in determining carbaryl residues in unpolished rice following the officially established method were studied from the viewpoints of pretreatment. The method developed for unpolished rice is as follows: carbaryl was extracted with a solvent mixture consisting of methylene chloride-acetone-water (1:1:1). The extract was cleaned up by partitioning between *n*-hexane and acetonitrile and by dual column chromatography, once on alumina and then on activated carbon. The eluates were concentrated; the carbaryl contained therein was hydrolyzed to α-naphthol with 0.5*N* KOH (aq) and coupled with 4-nitrobenzenediazonium fluoroborate to form a colored compound. The compound was determined by colorimetry in methanolic solution at 580 nm. The unpolished rice fortified with carbaryl gave 90% recovery.

74-1768. Fukuhara, K.; Takeda, M.; Tanabe, H. (Japan Food and Drug Safety Res. Cent., Tokyo, Japan). **[Studies on the analysis of pesticide residues in foods, Part 13. Analytical method of organophosphorus insecticide residues in agricultural products.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(6): 524-529; 1973.* (8 references) (Japanese)

Seven methods for determining 22 kinds of organophosphorus insecticide residues in vegetables using gas chromatography with FPD were investigated. Under the conditions examined it was impossible to separate and identify each of the 22 pesticides. The minimum detectable amount of 19 kinds of organophosphorus pesticides was 0.15-5 ng on 2% QF-1, and 0.3-3.0 ng on 25% DC-200 plus 0.25% Epon-1009; the limit of detection was calculated as 0.0015-0.05 ppm in the case of a 100 g specimen. It was found that dichloromethane was most suitable as the transfer solvent from the acetone extract of the specimen, and *n*-hexane containing 30% of acetone was suitable for eluting the activated charcoal column. In the recovery experiments on insecticides (diazinon, dimethoate, malathion, parathion, cidial, Surecide and ethion) added to nine species of vegetables (cucumber, green bean, taro, Komatsuna, field pea, Chinese cabbage, apple, Japanese pear and polished rice), moderately good results of 81-100% recovery were obtained, except for polished rice (70-86%).

74-1769. Takeda, M.; Sekita, H.; Otsuki, K.; Tanabe, H.; Kawai, Y.; Mishima, Y.; Kogo, K.; Katayama, Y. (Nat. Inst. of Hyg. Sci., Min. of Health and Welfare, Tokyo, Japan). **[Studies on the analysis of pesticide residues in foods, Part 11. Influence of the degree of powdering of specimens on the extraction of organochlorine pesticide residues from cereals and beans.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(6):569-573; 1973.* (5 references) (Japanese)

Using unpolished and polished rice, wheat, red beans and soybeans, the influence of the degree of powdering of the powdered specimens (20, 40, 60, and 100 mesh for the first four samples, and 20, 40 and 60 mesh for soybeans, respectively) on the extractability of organochlorine pesticide residues was examined. The technique used was the same as that reported in the previous parts of the same series of studies. In the cases of the first four samples in which the amounts of pesticide residues were comparatively small, the values obtained for organochlorine pesticides were almost constant regardless of the degree of powdering. A slight increasing tendency was seen accompanying the increasing of degree of powdering. The *p,p'*-DDT content of unpolished rice was 0.068, 0.071, 0.095 and 0.120 ppm for the 20, 40, 60, and 100 mesh specimens, respectively. In the powdered soybean specimen, which was difficult to crush to 100 mesh and had relatively high levels of the organochlorine pesticide residues, the values obtained were higher in the specimens at the high degree of powdering than at the lower degree of powdering (i.e., α-BHC was 0.076, 0.096, and 0.117 ppm, respectively, in 20, 40 and 60 mesh specimens).

74-1770. Takeda, M.; Suzuki, T.; Otsuki, K.; Sekita, H.; Fujisawa, K.; Hoshi, M. (Nat. Inst. of Hyg. Sci., Min. of Health and Welfare, Tokyo, Japan). **[Studies on the analysis of pesticide residues in foods, Part 12. Analytical method for organochlorine insecticide residues in onion.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 14(6): 574-579; 1973.* (6 references) (Japanese)

The removal of interfering substances containing organosulfur, such as methyl propyl disulfide and allyl propyl disulfide, in the pesticide analysis of onion using gas chromatography with ECD was examined after treatment with potassium permanganate. The stability of 13 organochlorine insecticides, α-, β-, γ-, and δ-BHC, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD (TDE), dicofol, aldrin, dieldrin, endrin, heptachlor, and heptachlor epoxide, to

potassium permanganate treatment was studied. Aldrin and heptachlor were quite unstable, and *p,p'*-DDE and *p,p'*-DDD were somewhat unstable; however, the other insecticides were very stable under the conditions studied. The large interfering peak found in the gas chromatogram of untreated extract of onion decreased with increasing amounts of potassium permanganate used in the treatment. It was shown in the present report that the recovery levels of insecticides added to onion homogenates were between 77 and 97%, except for aldrin, heptachlor, *p,p'*-DDE, and *p,p'*-DDT. The recoveries of *p,p'*-DDE and *p,p'*-DDD were very low, 56 and 54%, respectively, and recoveries of aldrin and heptachlor were practically zero.

74-1771. Mirkhaitov, T.; Ikramov, L. T. (Dept. Toxicol. Chem., Tashkent Inst. Pharmaceutics, Tashkent, USSR). **Izolirovaniye, obnaruzheniye i opredeleniye ftalofosa v biologicheskikh ob"ektakh. [Isolation, detection, and determination of phthalophos in biological materials.]** *Sud.-Med. Ekspertiza 16(2): 34-36; 1973.* (Russian)

A procedure is described for the isolation, detection, and determination of phthalophos (phosmet) in biological materials such as in human liver, gastric contents, and intestinal contents. Isolation is done with ether in a pH range of 1-5. The rates of phthalophos recovery from liver, gastric contents, and intestinal contents by threefold extraction with ether are 41%, 41-56%, and 27-40%. Chromatographic purification on silica gel layer is necessary for the analysis of gastric contents and intestinal contents. After visualization with chloroform, identification is done with bromophenol reagent. Following elution with chloroform, the eluates are dissolved in ethanol for determination with alcoholic solutions of silver nitrate, mercury dichloride, mercury dibromide, or iodine chloride.

74-1772. Ikramov, L. T.; Mirkhaitov, T. (Tashkent Inst. Pharm., Tashkent, USSR). **Vliyaniye konservirovaniya etanolom na sokhranyayemost' fozalona i ftalofosa v trupe. [Effect of preservation with ethanol on the stability of phosalone and phthalophos in corpses.]** *Sud.-Med. Ekspertiza 16(3): 35-37; 1973.* (Russian)

The preserving effect of ethanol on the stability of phosalone and phthalophos (phosmet) in cadaver liver was studied by photoelectrocolorimetric residue analysis. The preservation of the cadaver tissue with ethanol resulted in increased persistence of both the phosalone and phthalophos residues. After 30 days of preservation in ethanol at room temperature, 31% of the initial phosalone content was detected and fell to 10.5% in 150 days. The corresponding percentages of phthalophos, recovered after 30 and 150 days, were 23% and 7%, respectively.

74-1773. Ruzicka, J. H. A.; Abbott, D. C. (Lab. Government Chemist, Cornwall House, London, England). **Pesticide residue analysis.** *Talanta 20(12): 1261-1286; 1973.* (200 references)

The detection and determination of residual traces of pesticides in foodstuffs and plant and animal tissues is discussed in terms of extraction procedures, clean-up procedures, end-methods of determination, confirmatory techniques, the automation of pesticide analysis, and present problems in pesticide residue analysis. The end-methods of determination include biological, spectrophotometric, chromatographic (paper, thin-layer, gas-liquid, and liquid-liquid), polarographic, and radiochemical methods; derivative formation is also discussed.

74-1774. Richard, J. J.; Fritz, J. S. (Ames Lab.-USAEC, Dept. Chem., Iowa St. Univ., Ames). **Adsorption of chlorinated pesticides from river water with XAD-2 resin.** *Talanta 21(1): 91-92; 1974.* (8 references)

Amberlite XAD-2 was evaluated as an absorbent for the concentration of trace organochlorine pesticides from river water. The recovery of dieldrin from four liter river water samples by the XAD-2 procedure was compared with the results obtained using the standard extraction procedure. The results obtained using the two procedures were comparable, and the XAD-2 procedure was deemed easier. During periods of high run-off or at other times using larger samples, the following pesticides were not quantitatively detected using the XAD-2 procedure: *p,p'*-DDT; *p,p'*-DDE; *p,p'*-DDD; *o,p'*-DDT; heptachlor epoxide; lindane; atrazine; and several as yet uncharacterized agents.

74-1775. Kosmatyy, Ye. S.; Kavetskiy, V. N.; Lebedinskaya, N. N. (Ukrainian Sci. Res. Inst. Plant Protection, USSR). **Opredeleniye ostatkov diazinona v rasteniyakh metodom tonkosloynoy khromatografii. (Determination of diazinon residues in plants by thin-layer chromatography.)** *Ukr. Khim. Zh. 39(10): 1055-1059; 1973.* (14 references) (Russian)

A rapid and sensitive method is described for the thin-layer chromatographic determination of diazinon residues in plant materials. Following extraction with petroleum ether, removal of the solvent, and dissolution in carbon tetrachloride, the dry residue is placed on silica gel layer, using 10:0.5 ratio of carbon tetrachloride with acetone or of hexane with acetone as mobile phase. Visualization is done with equal ratios of 0.05% solution of bromophenol blue in 50% ethanol and 1% aqueous solution of silver nitrate. The blue background is then bleached with citric acid. The sensitivity of the method amounts to 1μg/100 g, the *Rf* value being 0.42.

74-1776. Stoimenov, V.; Kunchev, K. (Vet. Inst. of Infectious and Parasitic Diseases, Sofia, Bulgaria). **Vurkhu dokazvaneto na ostatuchni kolichestva ot fosfor-organichni i karbamatni pestitsidi. [Possibilities of demonstrating residual amounts of organic phosphorus and carbamate pesticides through the inhibition of some specific esterases and phosphatases.]** *Vet.-Med. Nauki 10(6): 19-25; 1973.* (14 references) (Bulgarian)

The suitability of nonspecific esterases and acid and alkaline phosphatases, obtained from chicken liver, honeybee larvae, and normal horse and calf serum, for the detection and quantitative determination of parathion, Fak-40 (prothoate), nogos (dichlorvos), BI-58 (dimethoate), neguvon (trichlorfon), phosdrin (mevinphos), carbaryl, azinphosmethyl, and methyl parathion was studied. Indoxylacetate, 5-bromoindoxylacetate, 1-naphthylacetate, and naphthol AS acetate, as well as 1-naphthylphosphate for phosphatases, were used as substrates with alumina as sorbent. The study of the inhibitory effect of the nonspecific esterases showed that these esterases are suitable for the detection of organophosphorus and carbamate pesticides in a minimum quantity of 2-8 μg. The acid and alkaline phosphatases proved unsuitable for the detection of pesticides due to their low activity.

See also **74-1550** **74-1561** **74-1580** **74-1605**

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